



Coverage Error in Mobile Web Surveys Across European Countries

Presented at ISM 2014
Bozen, Italy
December 2nd, 2014

Background

Survey data collection:

- trend towards advanced technology
- trend towards self-administration

(Couper, 2008)



Mobile Web surveys are an extension to landline Internet surveys.

Background

Opportunities of Mobile Web:

- RDD sampling
- a-synchronous character (time and place)
- non-contact

Challenges of Mobile Web:

- moderate level of mobile Web penetration
- early stage of mobile Web
- mainly early technology adopters have access to mobile Web
- Under-representation of certain socio-demographic subgroups



Coverage Error

Research Questions

1. How do bias estimates of the mobile Web population develop over time compared to bias estimates of the landline Internet population?
2. How do bias estimates of the mobile Web population develop with respect to the mobile Web penetration rate?
3. Do bias estimates of the mobile Web population arise from the no-smartphone or the no-mobile-phone population?
4. Do bias estimates caused by the no-mobile-phone and the no-smartphone population compensate each other?

Relative Coverage Bias

$$\text{RCB} = \frac{N (\text{No Mobile Web})}{N (\text{Total Sample})} \times \frac{p (\text{Mobile Web}) - p (\text{No Mobile Web})}{P (\text{Total Sample})}$$

$N (\text{No Mobile Web})$ = Subsample not covered by mobile Web

$N (\text{Total Sample})$ = Total Sample

$p (\text{Mobile Web})$ = Proportion of one socio-demographic value among the covered sample

$p (\text{No Mobile Web})$ = Proportion of the respective socio-demographic value among the non-covered sample

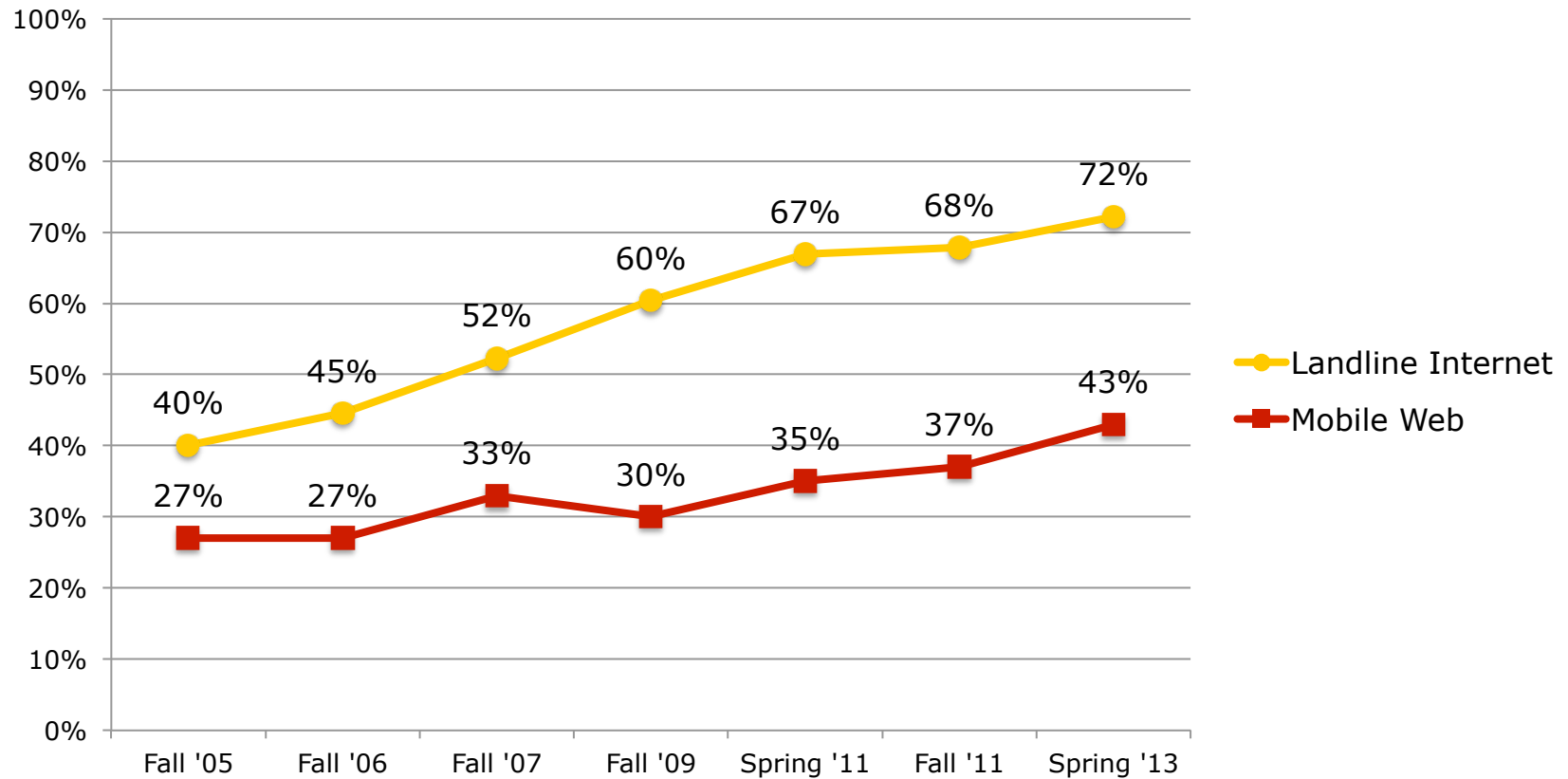
$P (\text{Total Sample})$ = Proportion of the respective socio-demographic value among the total sample

(Biemer & Lyberg, 2003)

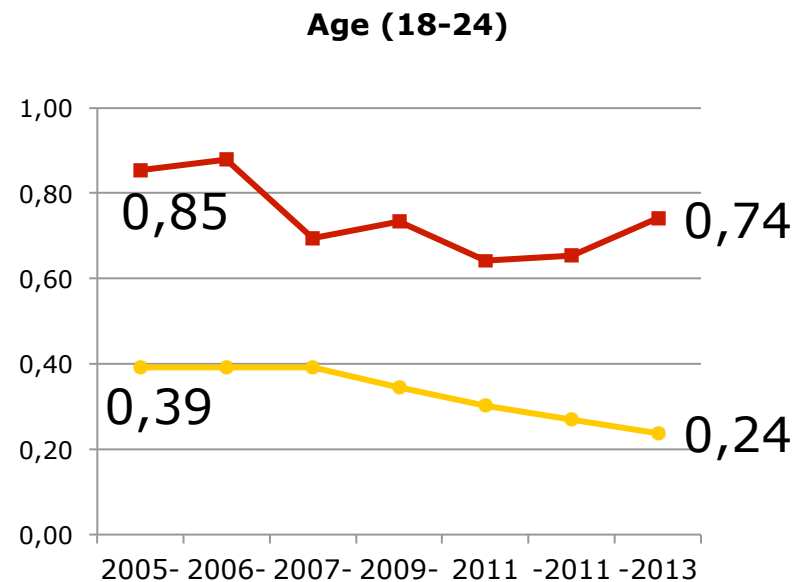
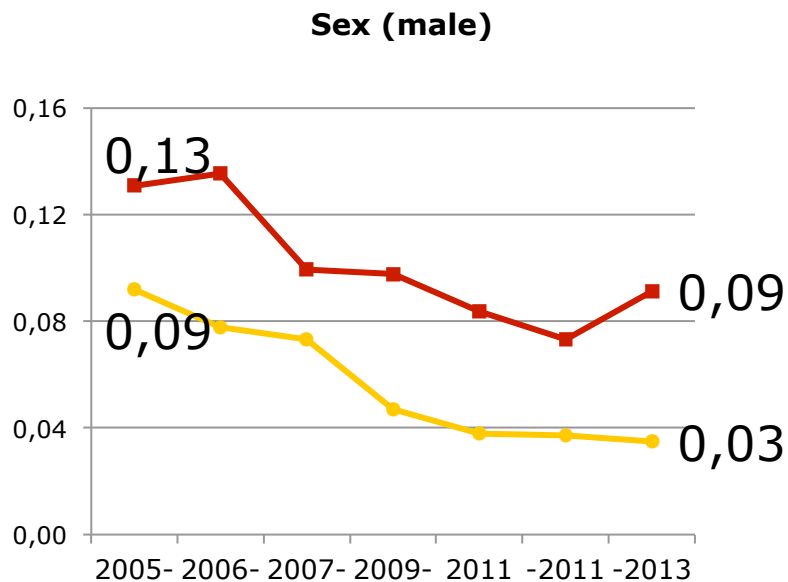
The Eurobarometer

- Trend survey of the European Commission
- Special Eurobarometer on “E-communications in the household”
 - questions concerning mobile Web and landline Internet access
- Seven survey waves: 2005 (fall), 2006 (fall), 2007 (fall), 2009 (fall), 2011 (spring), 2011 (fall), 2013 (spring)
- 27 European member states
- 500-1500 face-to-face interviews in each country
 - relatively complete coverage
- European population 18 years and older

Internet/Mobile Web Penetration Rate



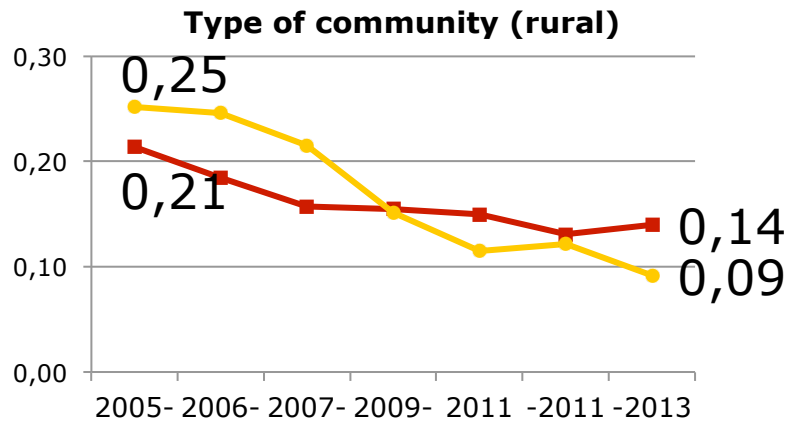
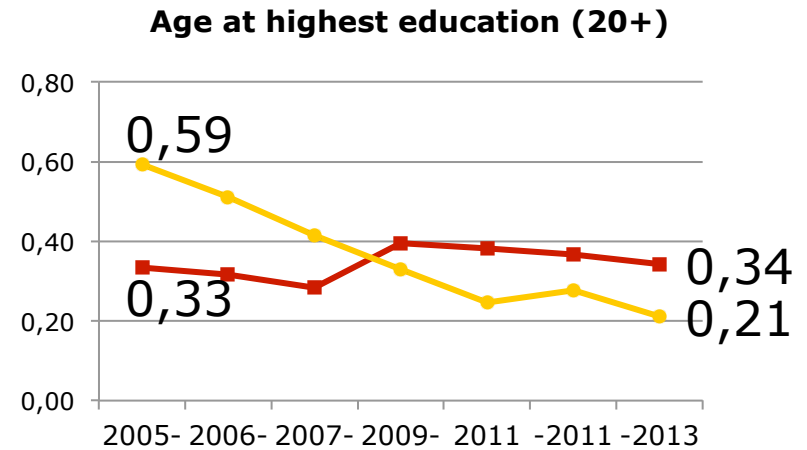
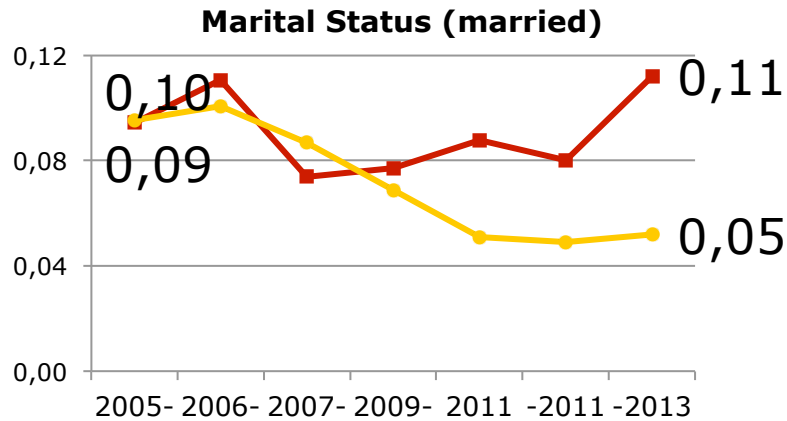
RCB: Mobile Web vs. Landline Internet



■ Mobile Web ● Landline Internet

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

RCB: Mobile Web vs. Landline Internet

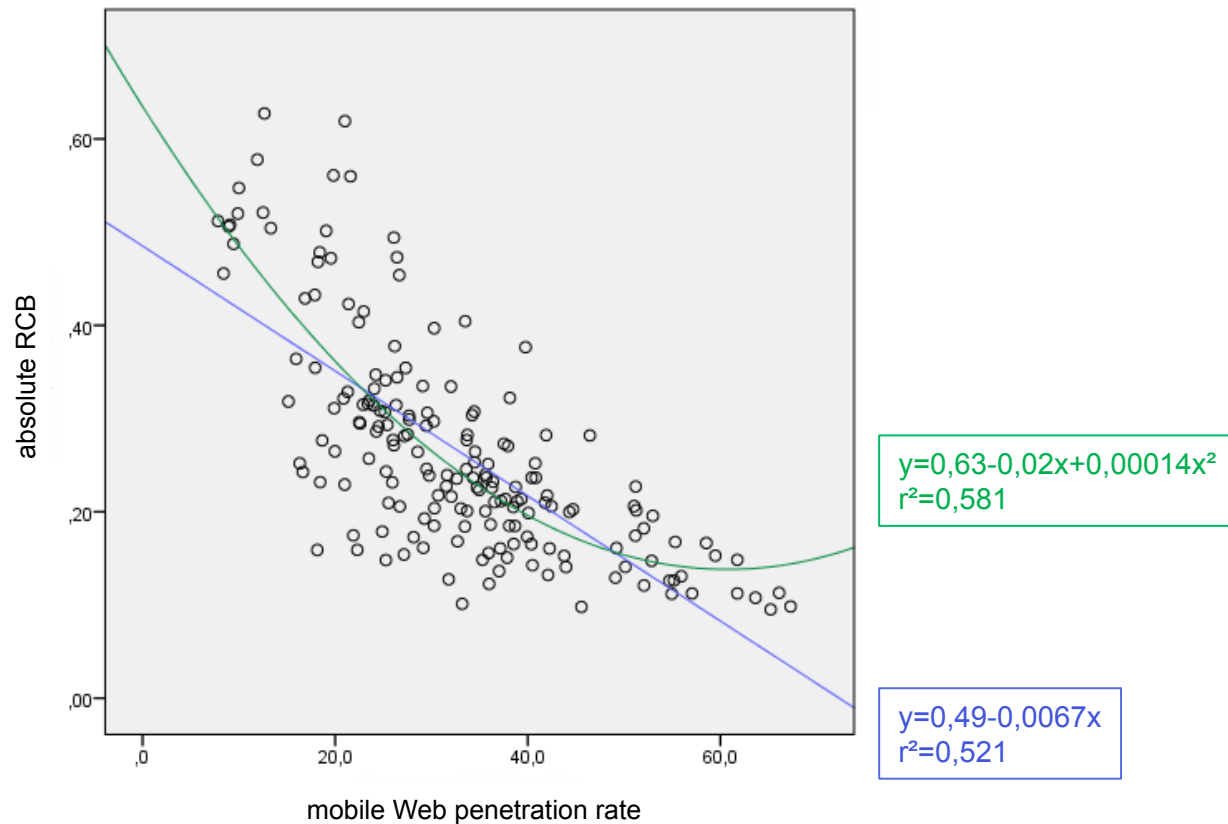


— Mobile Web — Landline Internet

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

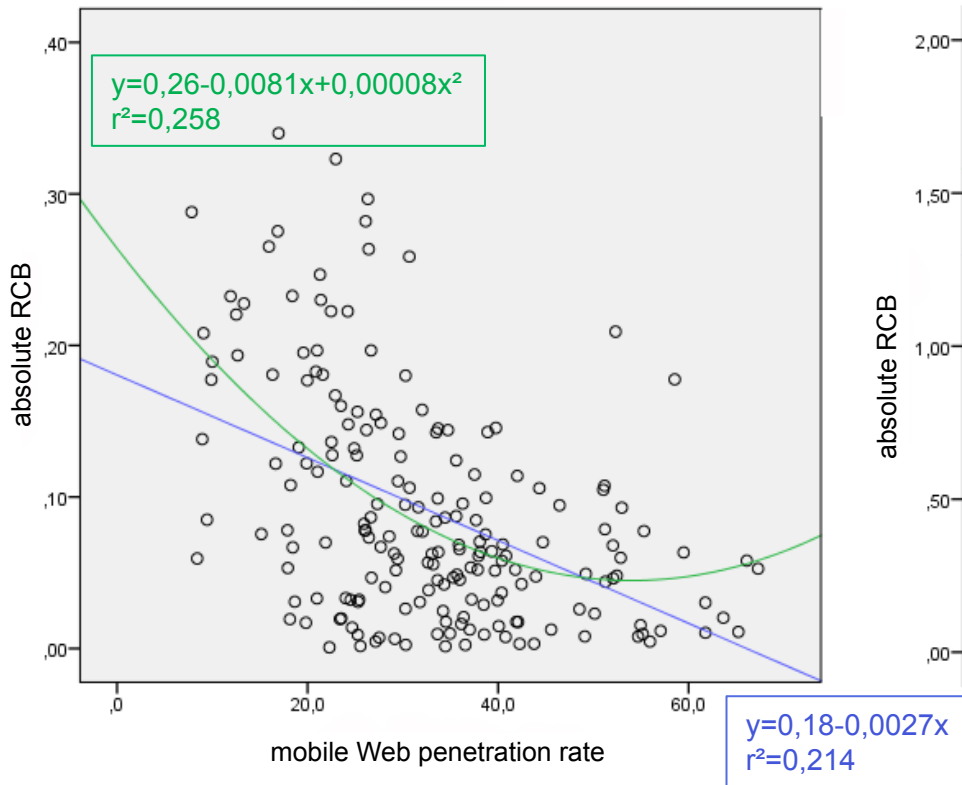
RCB: Mobile Web

Mean of the absolute RCB for all countries and waves

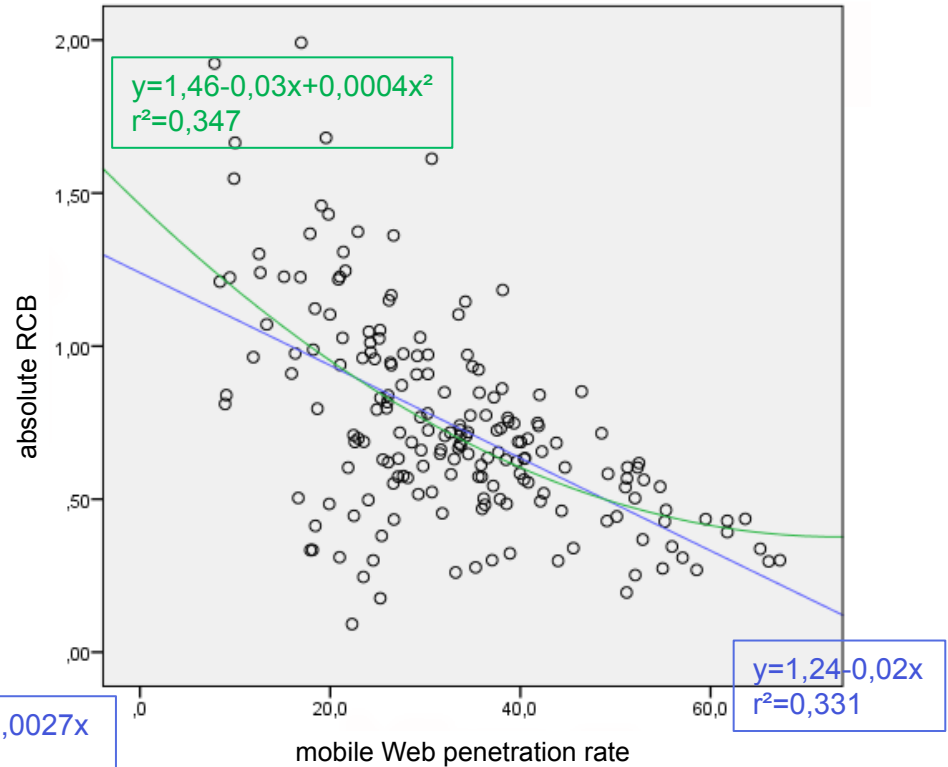


RCB: Mobile Web

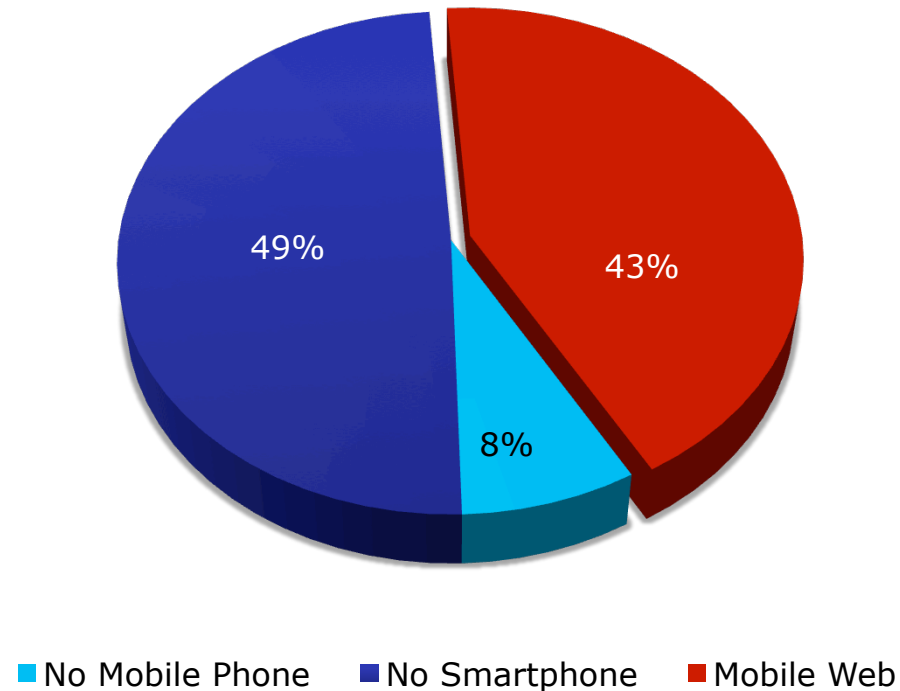
Marital Status (married)



Age (18-24)



Mobile Web Penetration Rate 2013



RCB: Mobile Web

RCB caused by the no-smartphone population

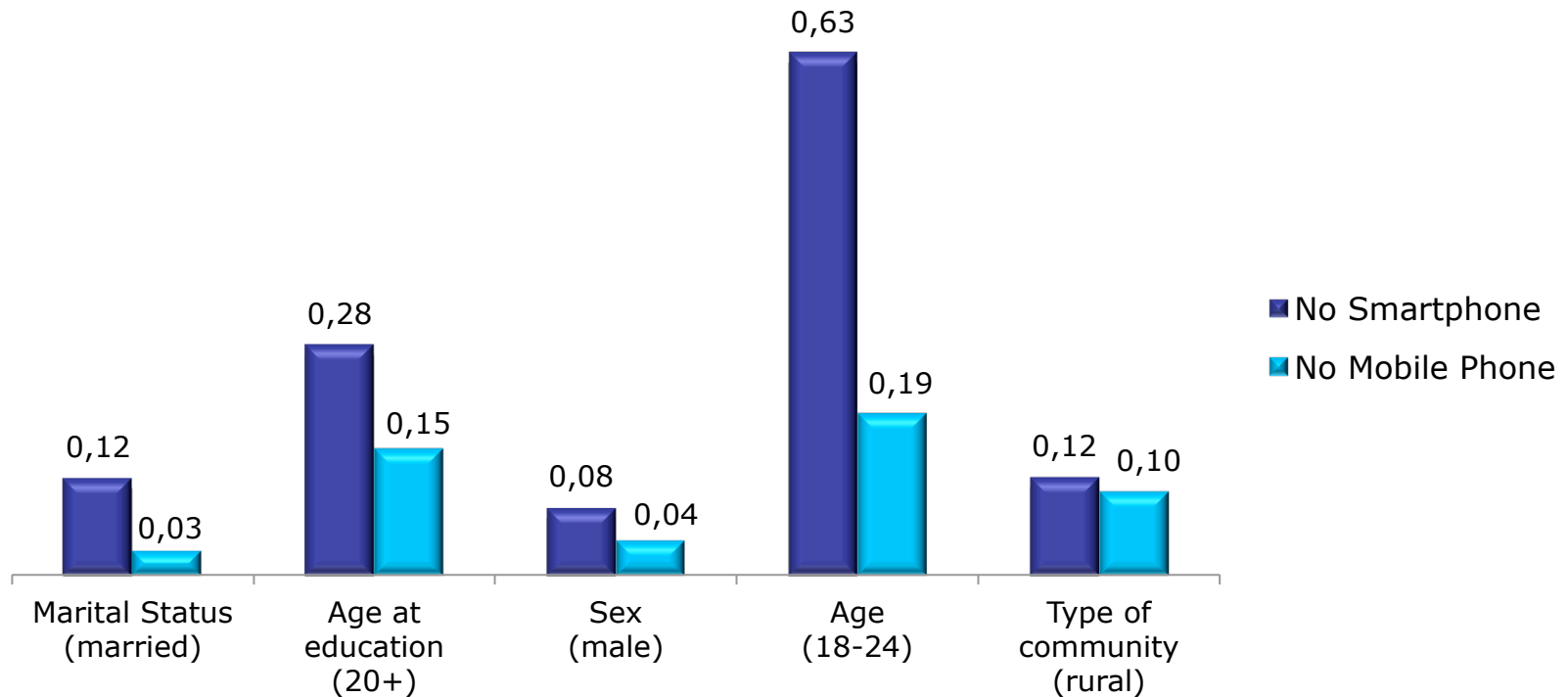
$$\text{RCB} = \frac{N(\text{No Smartphone})}{N(\text{Mobile Web} + \text{No Smartphone})} \times \frac{p(\text{Mobile Web}) - p(\text{No Smartphone})}{P(\text{Mobile Web} + \text{No Smartphone})}$$

RCB caused by the no-mobile-phone population

$$\text{RCB} = \frac{N(\text{No Mobile Phone})}{N(\text{Mobile Web} + \text{No Mobile Phone})} \times \frac{p(\text{Mobile Web}) - p(\text{No Mobile Phone})}{P(\text{Mobile Web} + \text{No Mobile Phone})}$$

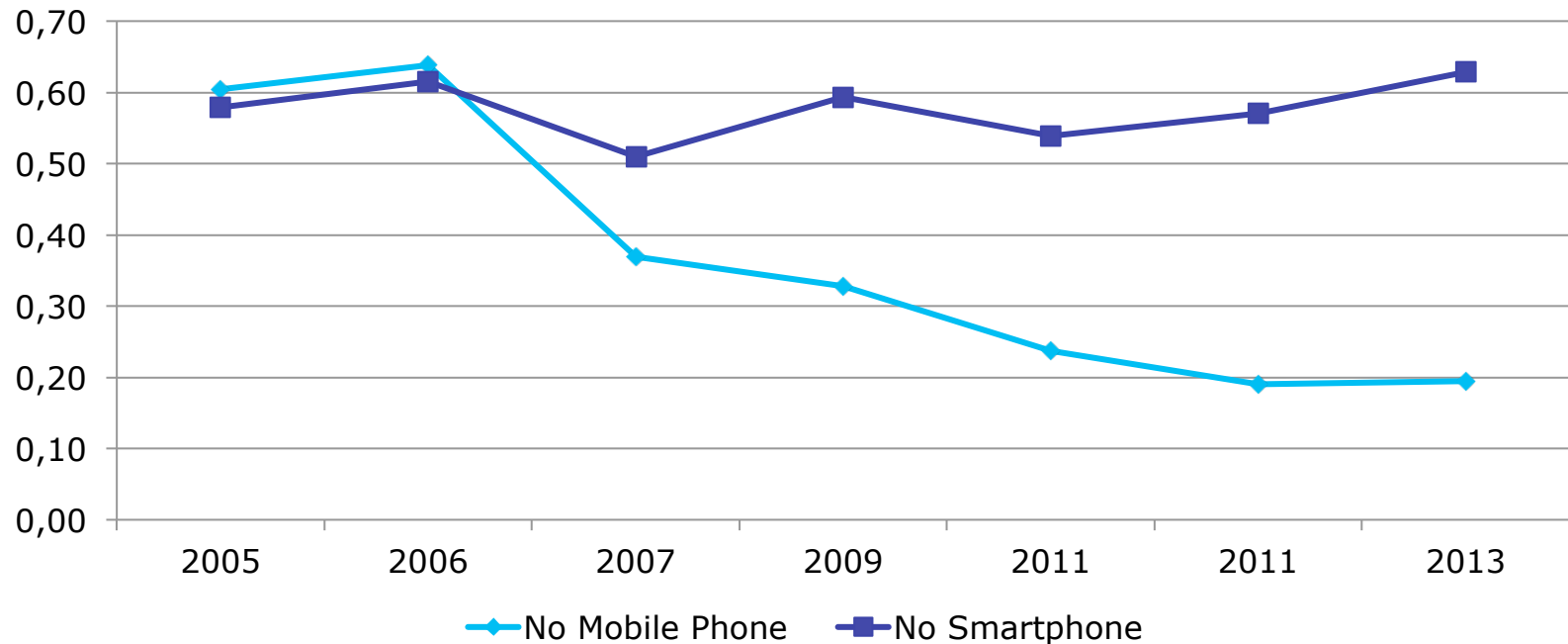
RCB: Mobile Web

RCB (mean) of the mobile Web population caused by the no-smartphone and no-mobile-phone population in 2013



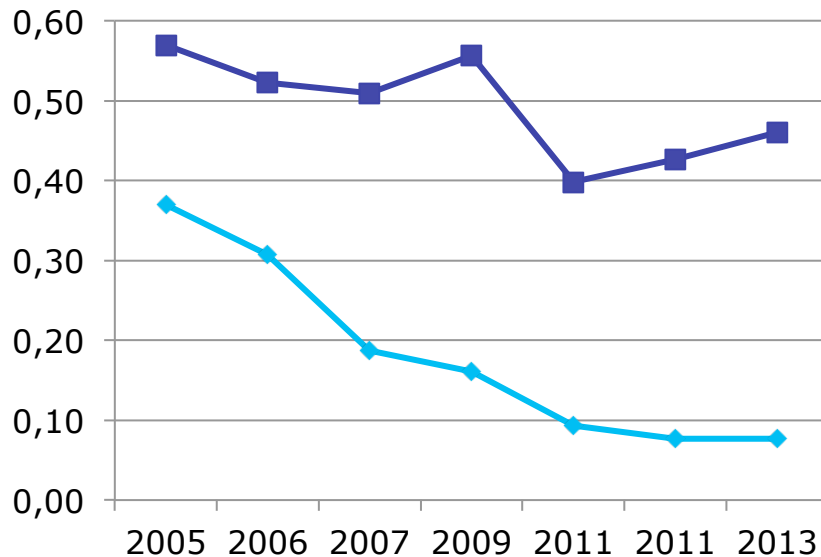
Mobile Web RCB for Age (18-24)

**Development of the RCB of the mobile Web population
caused by the no-smartphone and no-mobile-phone
population (mean)**

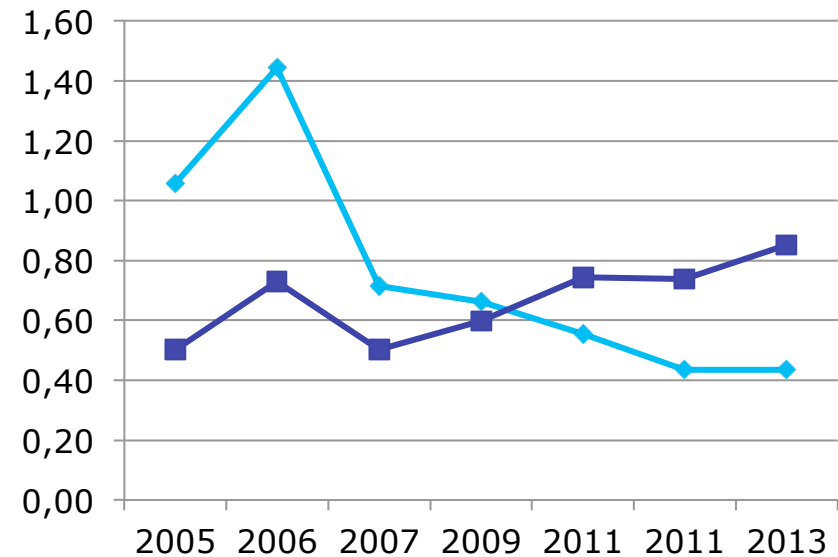


Mobile Web RCB for Age (18-24)

Countries with high mobile Web penetration rates in 2013 (RCB, mean)



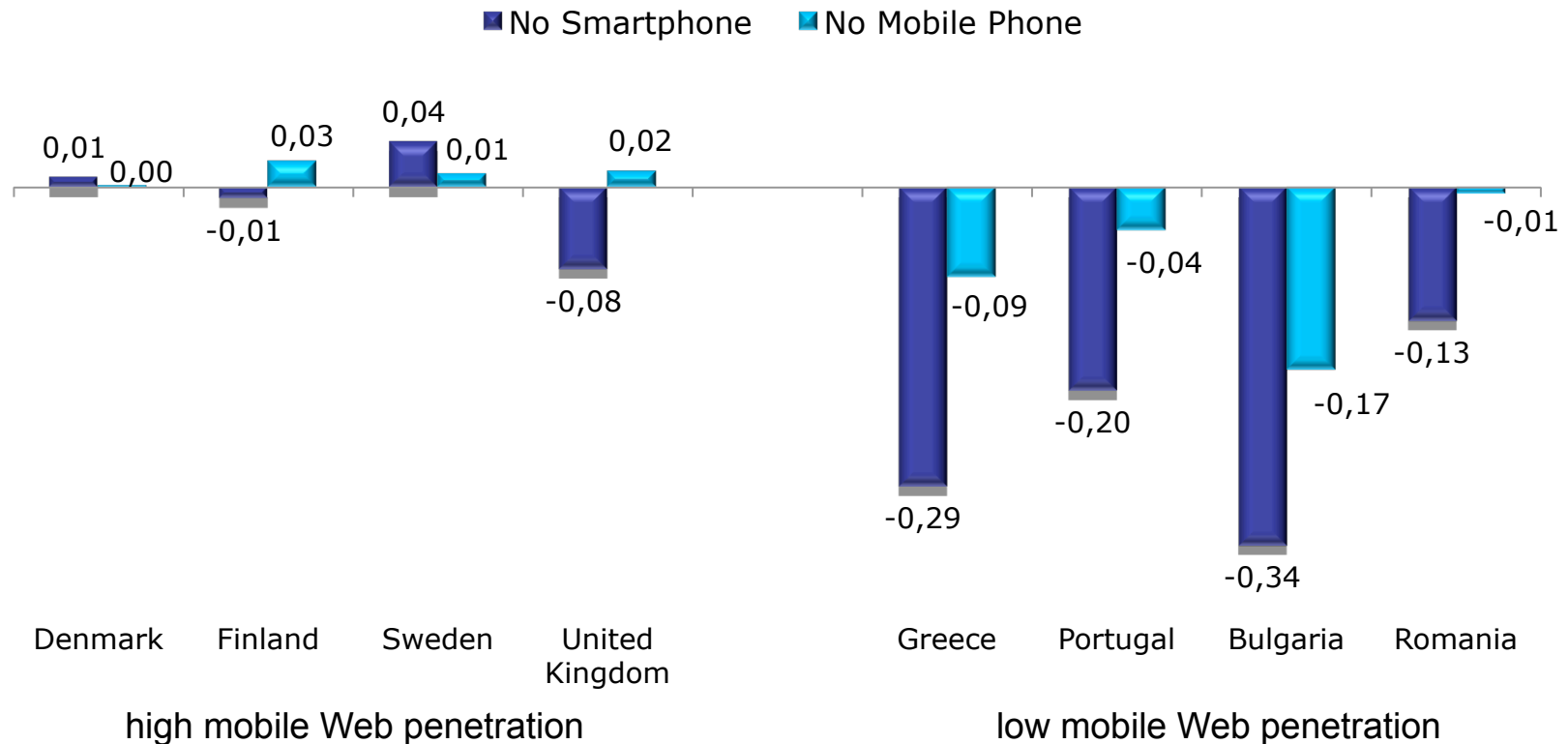
Countries with low mobile Web penetration rates in 2013 (RCB, mean)



—◆— No Mobile Phone —■— No Smartphone

Mobile Web RCB for Marital Status (married)

RCB of the mobile Web population caused by the no-smartphone and no-mobile-phone population in 2013



Summary

- Mobile Web and landline Internet bias estimates decreased over time but the landline Internet bias estimates decreased to a greater extent.
- In 2013 bias estimates for the landline Internet population were smaller than bias estimates for the mobile Web population for almost all countries and variables.
- Mobile Web bias estimates decline with increasing mobile Web penetration.
- In countries with low but increasing mobile Web penetration rates bias estimates caused by the no-smartphone population increase.
- Biases estimates caused by the no-smartphone and the no-mobile-phone population intensify each other.

Further Research:

- What country-level socio-economic variables refer to changes in the coverage bias estimates occurring over time and across countries?
- How do mobile Web bias estimates develop with increasing mobile Web penetration?
 - further decrease
 - reach a level close to zero
 - increase again

- It is still too early to use mobile Web surveys as a mode of data collection in the European population.
- If bias estimates further decline, mobile Web surveys will become worth considering for survey data collection in the European population.



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UNIVERSITÄT
DARMSTADT

Thank you.

**Darmstadt University of Technology
Department 02
Institute of Sociology
Research Methods
Dipl.-Soz. Anke Metzler**

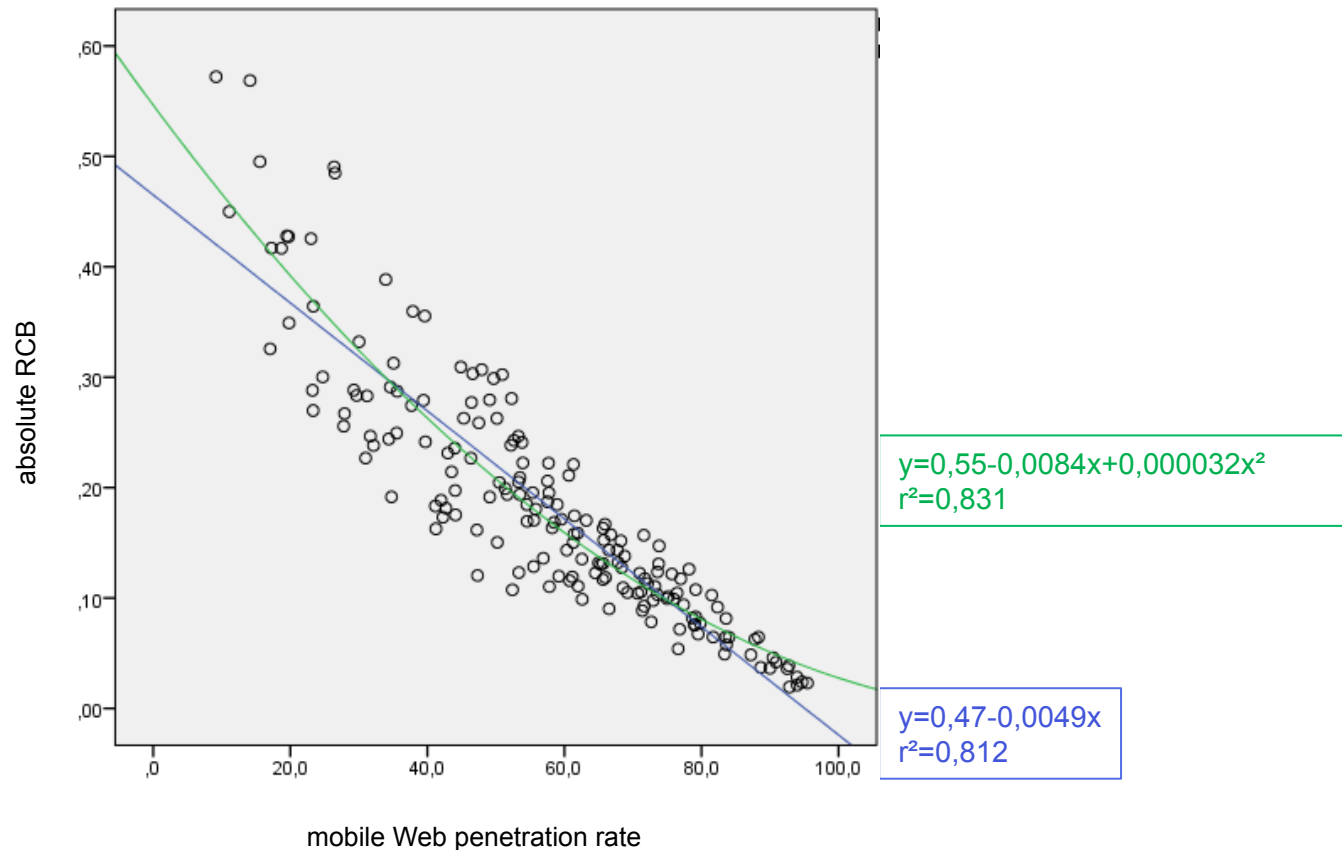
Erst-Ludwig-Str. 3/ Im Carree
64283 Darmstadt
Germany

Phone: +49 6151/16-70972
Fax: +49 6151/16-72070

metzler@ifs.tu-darmstadt.de

RCB: Landline Internet

Mean of the absolute RCB for all countries and waves



RCB: Mobile Web vs. Landline Internet

2007	MARITAL STATUS	AGE AT EDUCATION	SEX	AGE	TYPE OF COMMUNITY
AUSTRIA	LI	MOW	LI	LI	LI
BELGIUM	MOW	MOW	LI	LI	LI
BULGARIA	MOW	MOW	MOW	MOW	MOW
CYPRUS (REPUBLIC)	LI	LI	MOW	LI	MOW
CZECH REPUBLIC	LI	MOW	LI	LI	LI
DENMARK	MOW	LI	LI	LI	LI
ESTONIA	MOW	LI	LI	LI	MOW
FINLAND	MOW	MOW	LI	LI	LI
FRANCE	MOW	MOW	MOW	LI	MOW
GERMANY	LI	MOW	LI	LI	MOW
GREECE	LI	MOW	MOW	MOW	MOW
HUNGARY	MOW	MOW	MOW	MOW	MOW
IRELAND	MOW	LI	MOW	LI	MOW
ITALY	MOW	MOW	MOW	LI	MOW
LATVIA	MOW	MOW	MOW	LI	MOW
LITHUANIA	MOW	MOW	LI	MOW	MOW
LUXEMBOURG	MOW	MOW	LI	LI	LI
MALTA	MOW	LI	LI	LI	MOW
NETHERLANDS	LI	LI	LI	LI	LI
POLAND	MOW	MOW	LI	LI	MOW
PORTUGAL	LI	MOW	LI	LI	LI
ROMANIA	LI	MOW	LI	LI	MOW
SLOVAKIA	LI	MOW	LI	MOW	MOW
SLOVENIA	LI	MOW	LI	LI	MOW
SPAIN	LI	MOW	LI	LI	MOW
SWEDEN	MOW	MOW	LI	LI	LI
UNITED KINGDOM	MOW	MOW	LI	LI	LI

RCB mobile Web <= RCB landline Internet →

MOW

RCB mobile Web > RCB landline Internet →

LI

RCB: Mobile Web vs. Landline Internet

2013	MARITAL STATUS	AGE AT EDUCATION	SEX	AGE	TYPE OF COMMUNITY
AUSTRIA	LI	LI	LI	LI	MOW
BELGIUM	LI	LI	LI	LI	MOW
BULGARIA	LI	MOW	LI	LI	LI
CYPRUS (REPUBLIC)	LI	LI	LI	LI	LI
CZECH REPUBLIC	LI	LI	LI	LI	LI
DENMARK	MOW	LI	LI	LI	LI
ESTONIA	MOW	LI	LI	LI	LI
FINLAND	MOW	LI	LI	LI	LI
FRANCE	LI	LI	LI	LI	LI
GERMANY	LI	MOW	LI	LI	LI
GREECE	LI	LI	LI	LI	LI
HUNGARY	LI	LI	LI	LI	LI
IRELAND	LI	LI	MOW	LI	LI
ITALY	LI	LI	LI	LI	LI
LATVIA	MOW	LI	MOW	LI	LI
LITHUANIA	MOW	LI	LI	LI	MOW
LUXEMBOURG	LI	LI	LI	LI	MOW
MALTA	LI	LI	MOW	LI	LI
NETHERLANDS	LI	LI	LI	LI	LI
POLAND	MOW	LI	LI	LI	MOW
PORTUGAL	LI	LI	MOW	LI	MOW
ROMANIA	LI	LI	LI	LI	LI
SLOVAKIA	LI	LI	LI	LI	LI
SLOVENIA	LI	LI	LI	LI	LI
SPAIN	LI	LI	LI	LI	MOW
SWEDEN	LI	LI	LI	LI	LI
UNITED KINGDOM	MOW	LI	LI	LI	LI

RCB mobile Web <= RCB landline Internet →

MOW

RCB mobile Web > RCB landline Internet →

LI

Back Up

RCB Mobileweb 2013

	Marital Status (married)	Age 20+ at end education	Sex (male)	Age (18-24)	Type of community (rural)	Average bias (of absolute values)
	RCB	RCB	RCB	RCB	RCB	RCB
AUSTRIA	-,09	,31	,10	,85	-,05	,28
BELGIUM	-,11	,37	,09	,52	,00	,22
BULGARIA	-,34	,18	-,02	1,99	-,49	,60
CYPRUS (REPUBLIC)	-,26	,70	,10	1,17	-,14	,47
CZECH REPUBLIC	-,10	,41	,10	,48	-,05	,23
DENMARK	,01	,03	,03	,34	-,07	,10
ESTONIA	-,06	,13	,14	,63	-,22	,24
FINLAND	,00	,12	,10	,34	-,08	,13
FRANCE	-,10	,27	,04	,54	-,07	,21
GERMANY	-,06	,15	,17	1,18	-,05	,32
GREECE	-,28	,70	,23	,84	-,42	,49
HUNGARY	-,09	,65	,14	,55	-,25	,34
IRELAND	-,07	,25	,01	,50	-,08	,18
ITALY	-,15	,44	,23	,69	-,39	,38

Back Up

RCB Mobileweb 2013

	Marital Status (married)	Age 20+ at end education	Sex (male)	Age (18-24)	Type of community (rural)	Average bias (of absolute values)
	RCB	RCB	RCB	RCB	RCB	RCB
LATVIA	-,05	,07	-,01	,62	-,03	,16
LITHUANIA	,03	,19	,06	,72	-,17	,23
LUXEMBOURG	-,08	,21	,07	,46	-,01	,17
MALTA	-,26	,47	,03	1,61	,02	,48
NETHERLANDS	-,09	,13	,06	,56	-,14	,20
POLAND	-,05	,30	,21	,68	-,11	,27
PORTUGAL	-,18	1,25	,01	1,25	-,12	,56
ROMANIA	-,12	,56	,16	,94	-,40	,43
SLOVAKIA	-,05	,54	,13	,62	-,15	,30
SLOVENIA	-,21	,22	,09	,60	-,12	,25
SPAIN	-,08	,38	,08	,57	-,03	,23
SWEDEN	,05	,04	,03	,30	-,07	,10
UNITED KINGDOM	-,06	,16	,04	,44	-,07	,15

Back Up

RCB Landline Internet 2013

	Marital Status (married)	Age 20+ at end education	Sex (male)	Age (18-24)	Type of community (rural)	Average bias (of absolute values)
	RCB	RCB	RCB	RCB	RCB	RCB
AUSTRIA	,07	,22	,02	,26	-,06	,13
BELGIUM	,04	,16	,03	,11	,04	,08
BULGARIA	-,03	,35	,00	,54	-,41	,26
CYPRUS (REPUBLIC)	-,01	,31	,05	,35	-,07	,16
CZECH REPUBLIC	,05	,26	,08	,27	-,03	,14
DENMARK	,04	,01	,00	,01	-,02	,02
ESTONIA	,08	,11	,02	,23	-,08	,10
FINLAND	,09	,09	,04	,20	-,04	,09
FRANCE	,10	,17	,04	,09	-,02	,08
GERMANY	,05	,17	,07	,21	,01	,10
GREECE	-,03	,48	,10	,34	-,27	,25
HUNGARY	,08	,37	,05	,14	-,11	,15
IRELAND	,02	,18	-,02	,12	-,02	,07
ITALY	,04	,21	-,03	,19	-,21	,14

Back Up

RCB Landline Internet 2013

	Marital Status (married)	Age 20+ at end education	Sex (male)	Age (18-24)	Type of community (rural)	Average bias (of absolute values)
	RCB	RCB	RCB	RCB	RCB	RCB
LATVIA	,11	,07	-,02	,23	-,03	,09
LITUANIA	,08	,18	,05	,39	-,22	,18
LUXEMBOURG	,05	,07	,04	,13	,03	,06
MALTA	,02	,23	,04	,27	,00	,11
NETHERLANDS	,03	,04	,01	,03	,00	,02
POLAND	,08	,24	,03	,30	-,12	,16
PORTUGAL	,05	,59	-,04	,63	-,21	,30
ROMANIA	,00	,32	,01	,41	-,24	,20
SLOVAKIA	,04	,28	,03	,32	-,13	,16
SLOVENIA	,03	,11	,05	,24	-,02	,09
SPAIN	,04	,30	,04	,25	-,03	,13
SWEDEN	,04	,01	,00	,06	,01	,02
UNITED KINGDOM	,09	,15	,03	,10	,04	,08

Back Up



Mobile Web Penetration

	Fall '05	Fall '06	Fall '07	Fall '09	Spring '11	Fall '11	Spring '13
BULGARIA	9%	8%	18%	19%	10%	13%	17%
ROMANIA	9%	10%	18%	9%	8%	13%	21%
PORTUGAL	18%	17%	26%	18%	21%	12%	22%
GREECE	24%	21%	27%	16%	22%	20%	26%
CYPRUS (REPUBLIC)	25%	24%	21%	13%	23%	25%	26%
HUNGARY	26%	29%	29%	25%	25%	24%	27%
MALTA	20%	21%	18%	20%	27%	29%	31%
BELGIUM	16%	15%	27%	18%	33%	26%	31%
POLAND	26%	25%	36%	33%	33%	27%	34%
CZECH REPUBLIC	35%	32%	41%	38%	27%	28%	36%
GERMANY	22%	21%	20%	28%	30%	33%	38%
SLOVAKIA	26%	25%	35%	37%	37%	36%	40%
ITALY	33%	30%	33%	19%	24%	22%	40%
ESTONIA	34%	40%	42%	40%	42%	44%	40%
AUSTRIA	32%	28%	32%	34%	38%	41%	46%
LITHUANIA	24%	25%	39%	23%	32%	34%	49%
FRANCE	24%	23%	25%	30%	38%	39%	51%
SPAIN	29%	26%	35%	23%	23%	30%	51%

Back Up

Mobile Web Penetration

	Fall '05	Fall '06	Fall '07	Fall '09	Spring '11	Fall '11	Spring '13
IRELAND	17%	30%	34%	27%	34%	42%	52%
SLOVENIA	37%	36%	42%	45%	51%	62%	52%
LATVIA	29%	35%	42%	39%	46%	49%	52%
NETHERLANDS	29%	30%	36%	34%	44%	50%	53%
LUXEMBOURG	37%	36%	49%	26%	52%	55%	55%
FINLAND	34%	36%	39%	39%	51%	59%	56%
UNITED KINGDOM	32%	38%	36%	40%	53%	55%	59%
DENMARK	34%	38%	40%	44%	55%	64%	65%
SWEDEN	38%	36%	42%	57%	62%	66%	67%
Total	27%	27%	33%	30%	35%	37%	43%

Back Up

Landline Internet Penetration

	Fall '05	Fall '06	Fall '07	Fall '09	Spring '11	Fall '11	Spring '13
PORTUGAL	19%	29%	35%	38%	50%	46%	51%
ROMANIA	11%	14%	26%	34%	45%	47%	53%
GREECE	20%	20%	23%	40%	48%	45%	53%
BULGARIA	9%	16%	26%	38%	50%	48%	57%
HUNGARY	20%	23%	30%	46%	53%	53%	62%
ITALY	35%	35%	44%	53%	56%	58%	63%
LITUANIA	17%	30%	39%	49%	58%	58%	64%
SPAIN	31%	36%	42%	51%	58%	60%	65%
POLAND	25%	32%	40%	54%	61%	61%	66%
CYPRUS (REPUBLIC)	28%	28%	41%	52%	61%	61%	67%
SLOVAKIA	17%	23%	34%	52%	59%	61%	67%
AUSTRIA	43%	43%	56%	58%	63%	66%	68%
CZECH REPUBLIC	31%	36%	52%	55%	59%	66%	69%
LATVIA	23%	32%	42%	55%	69%	68%	74%
ESTONIA	44%	51%	61%	66%	72%	74%	75%
GERMANY	52%	57%	65%	68%	71%	74%	76%
IRELAND	41%	47%	55%	66%	76%	77%	77%
SLOVENIA	49%	50%	62%	68%	74%	72%	78%

Back Up

Landline Internet Penetration

	Fall '05	Fall '06	Fall '07	Fall '09	Spring '11	Fall '11	Spring '13
MALTA	43%	54%	53%	72%	76%	74%	79%
UNITED KINGDOM	53%	59%	61%	66%	73%	77%	79%
BELGIUM	55%	62%	63%	65%	73%	73%	79%
FRANCE	44%	47%	58%	69%	71%	75%	79%
FINLAND	60%	66%	71%	78%	82%	79%	82%
LUXEMBOURG	66%	67%	71%	79%	82%	84%	88%
DENMARK	72%	80%	84%	87%	90%	91%	93%
NETHERLANDS	84%	84%	89%	91%	95%	94%	94%
SWEDEN	79%	77%	83%	88%	93%	93%	95%
Total	40%	45%	52%	60%	67%	68%	72%