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## **Coverage Error in Mobile Web Surveys Across European Countries**

Presented at WAPOR 2014  
Nice, France  
September 4<sup>th</sup>, 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

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1. How do bias estimates of the mobile Web population develop over time?
2. How do bias estimates of the mobile Web population develop over time compared to bias estimates of the landline Internet population?
3. Do bias estimates of the mobile Web population differ between the European member states and what country-level variables do explain the differences?

# Relative Coverage Bias

$$RCB = (N_{nc} / N) * ((p_c - p_{nc}) / P)$$

$N_{nc}$  = Subsample not covered by mobile Web

$N$  = Total Sample

$p_c$  = Proportion of one socio-demographic value among the covered sample

$p_{nc}$  = Proportion of the respective socio-demographic value among the non-covered sample

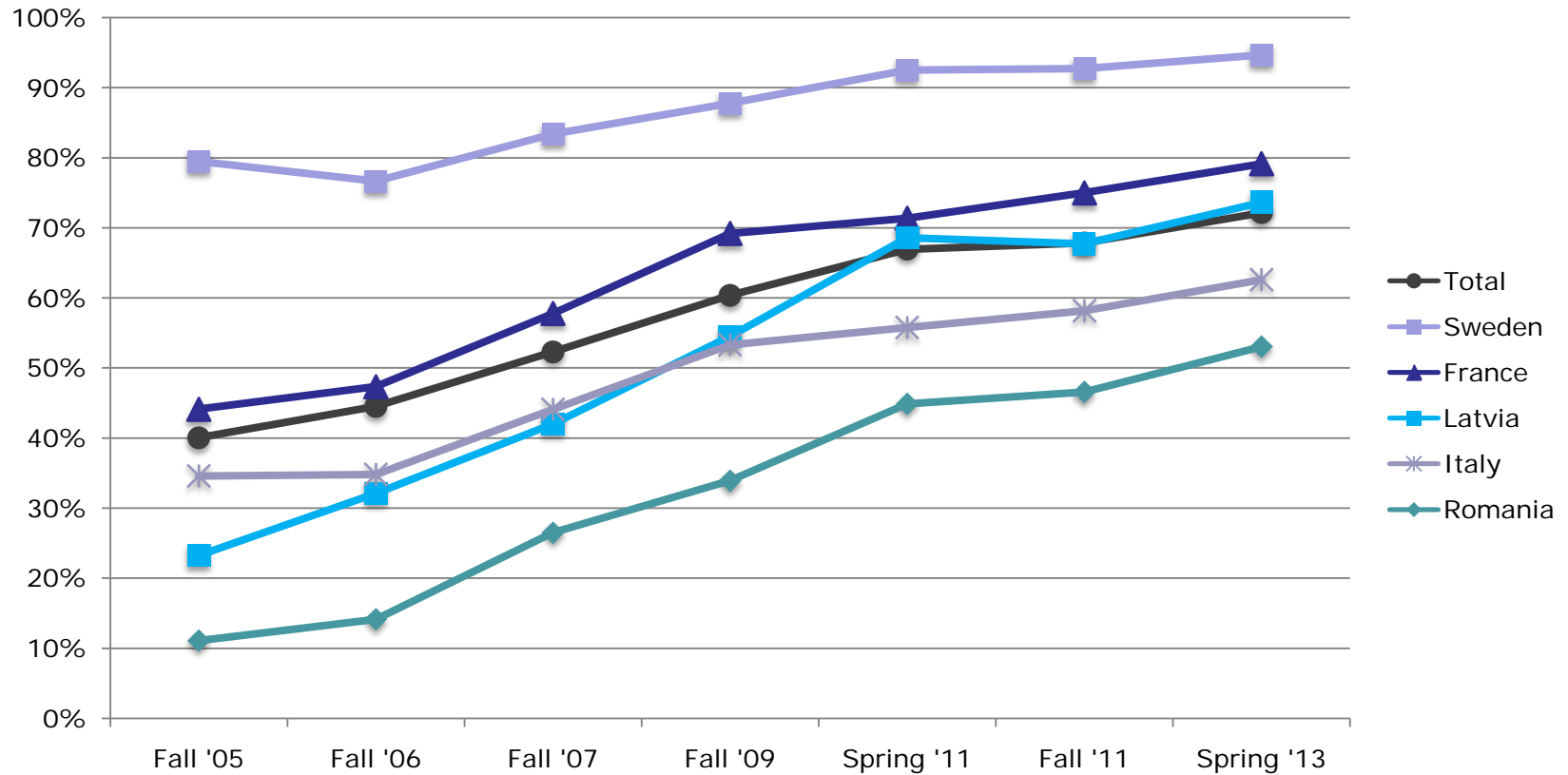
$P$  = Proportion of the respective socio-demographic value among the total sample

(Biemer & Lyberg, 2003)

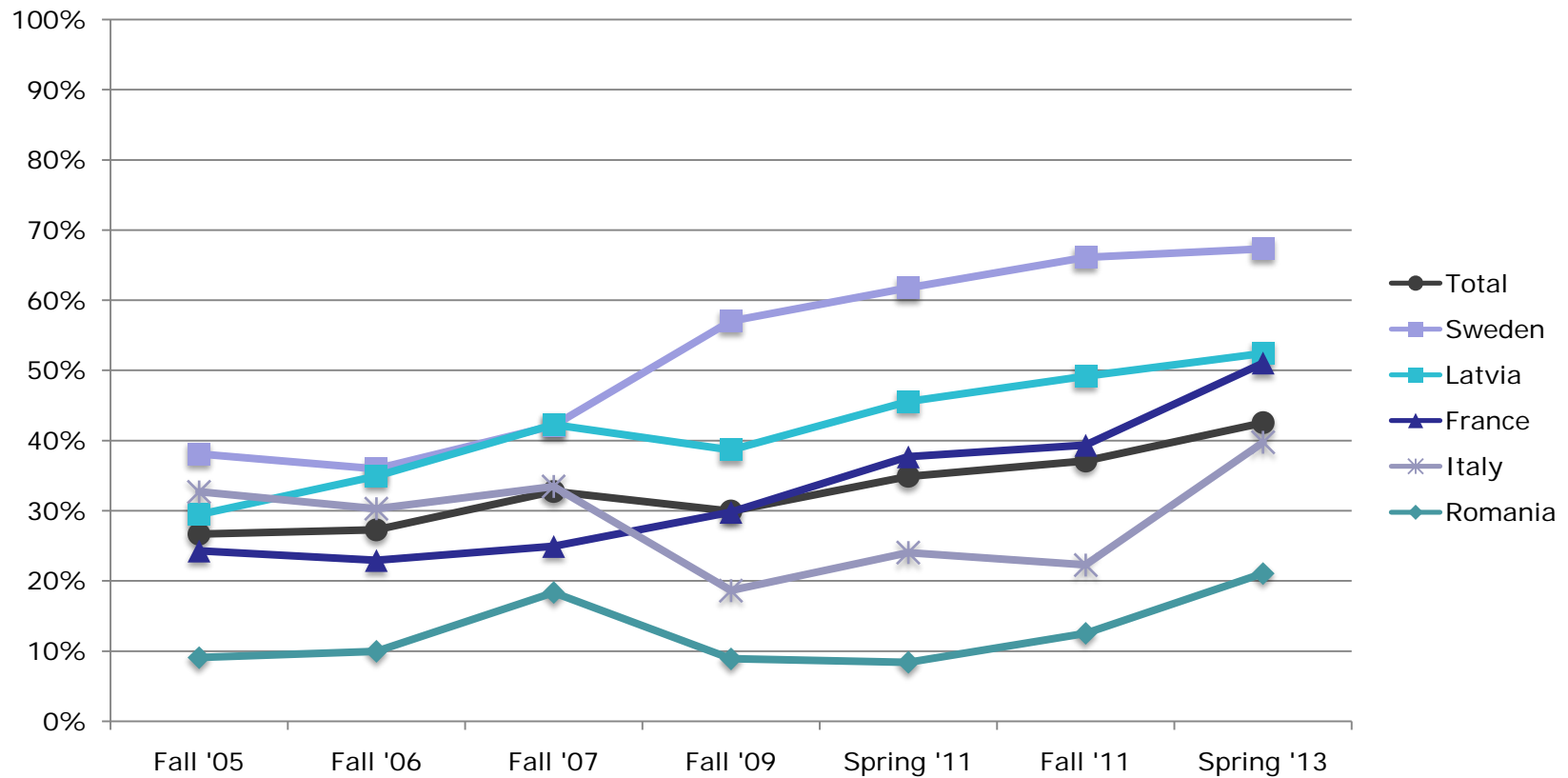
# The Eurobarometer

- 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 Penetration Rate



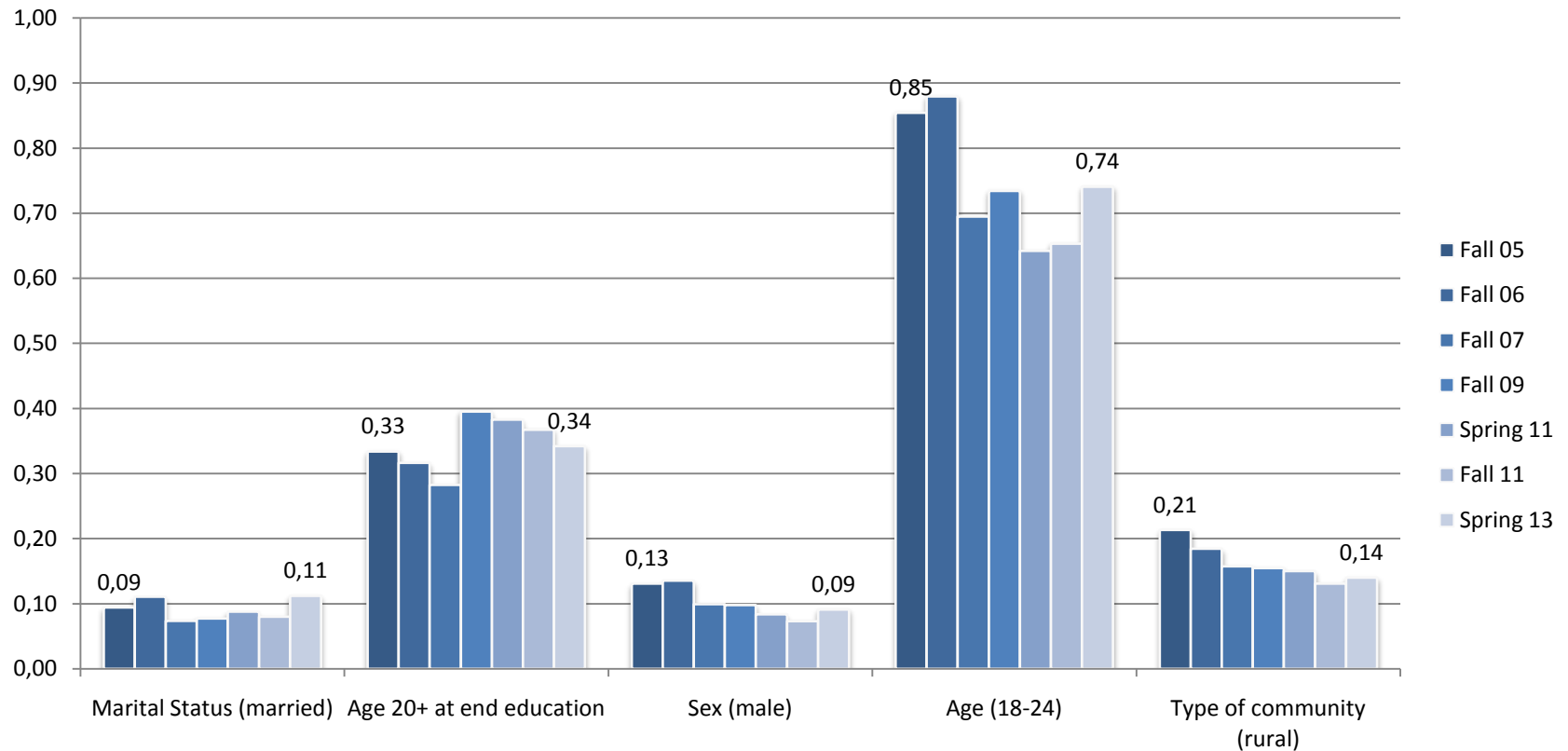
# Mobile Web Penetration Rate





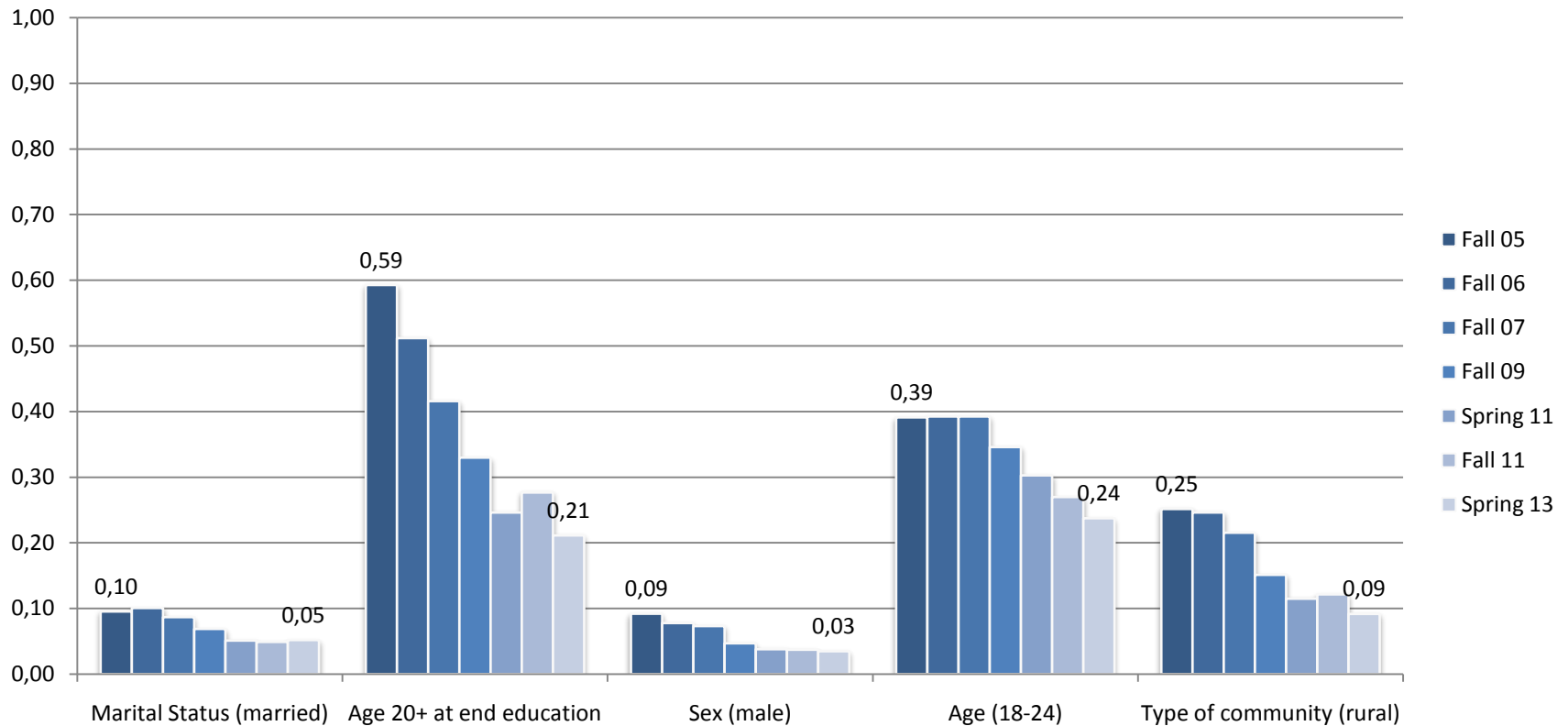
# RCBs: Mobile Web Sample

## Mobile Web

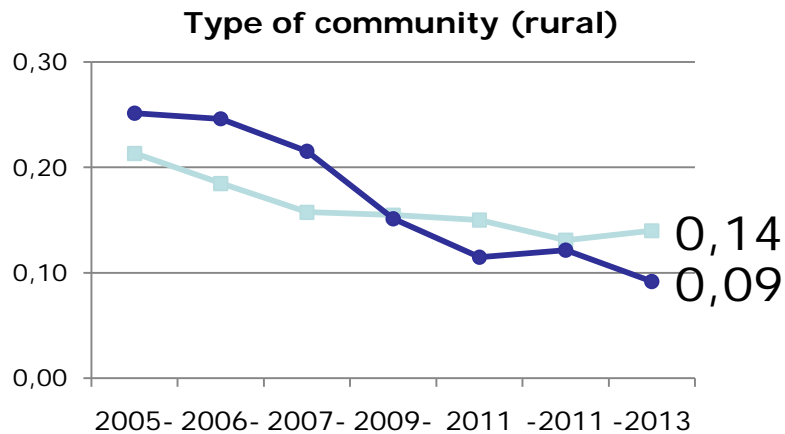
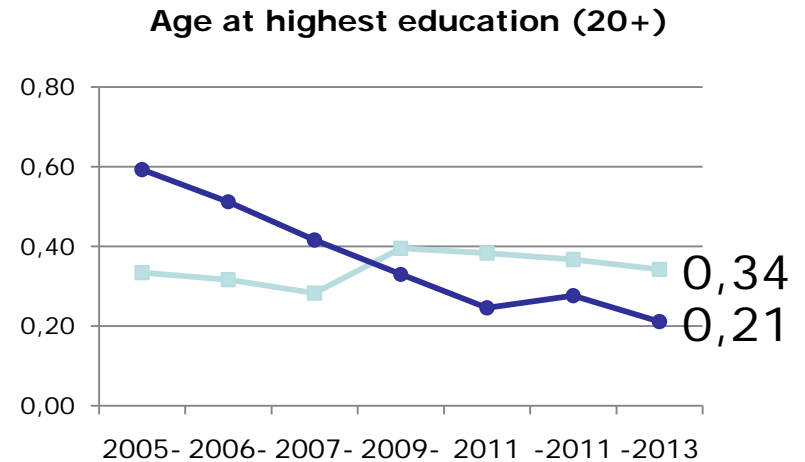
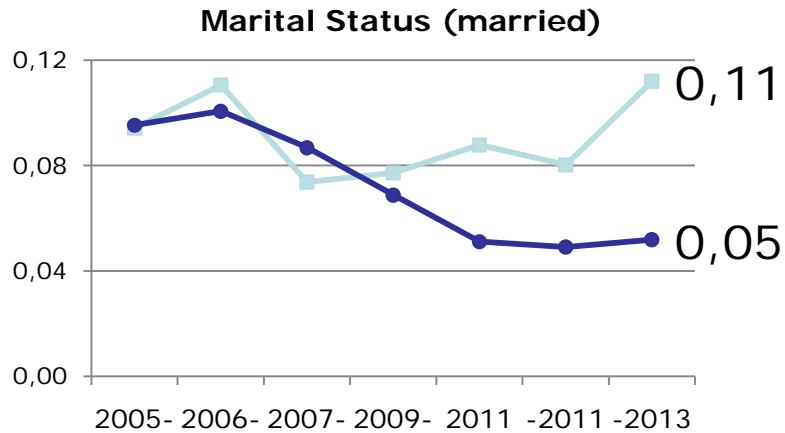


# RCBs: Landline Internet Sample

## Landline Internet



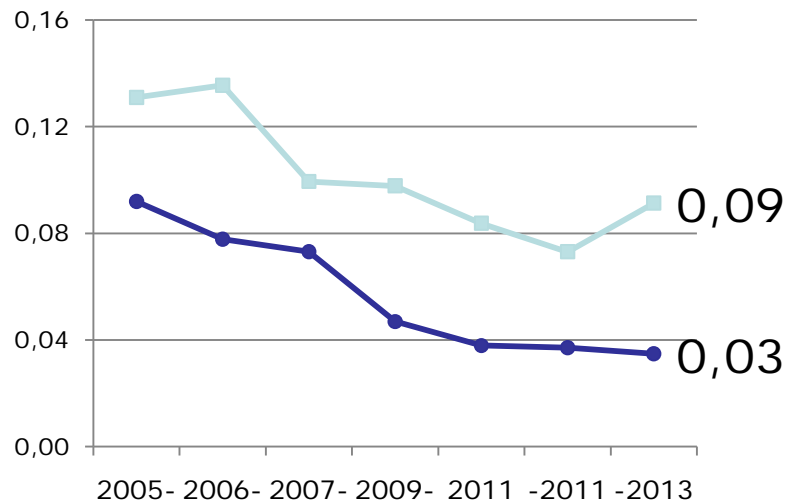
# RCBs: Mobile Web vs. Landline Internet



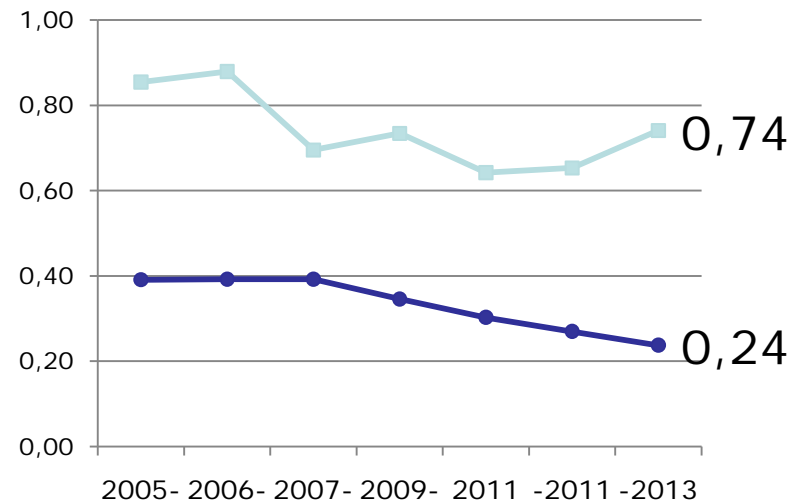
Note. The y-axis scaling differs between the graphs.

# RCBs: Mobile Web vs. Landline Internet

Sex (male)



Age (18-24)



—■— Mobile —●— Landline

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

# RCBs: Mobile Web vs. Landline Internet

RCB mobile Web <= RCB landline Internet → MOW

RCB mobile Web (-) & RCB landline Internet (+) → \*

RCB mobile Web > RCB landline Internet → LI

Mobile Web 2013	Marital Status (married)	Age at highest education (20+)	Sex (male)	Age (18-24)	Type of community (rural)
Sweden	,05	,04	,03	,30	-,07
France	-,10	,27	,04	,54	-,07
Latvia	-,05	,07	-,01	,62	-,03
Italy	-,15	,44	,23	,69	-,39
Romania	-,12	,56	,16	,94	-,40

Landline Internet 2013	Marital Status (married)	Age at highest education (20+)	Sex (male)	Age (18-24)	Type of community (rural)
Sweden	,04	,01	,00	,06	,01
France	,10	,17	,04	,09	-,02
Latvia	,11	,07	-,02	,23	-,03
Italy	,04	,21	-,03	,19	-,21
Romania	,00	,32	,01	,41	-,24

2013	Marital Status (married)	Age at highest education (20+)	Sex (male)	Age (18-24)	Type of community (rural)
Sweden	LI	LI	LI	LI	LI*
France	MOW*	LI	MOW	LI	LI
Latvia	MOW*	MOW	MOW	LI	MOW
Italy	LI*	LI	LI	LI	LI
Romania	LI*	LI	LI	LI	LI

# Multilevel Analysis

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
<b>Bias estimates (reference group, age):</b>							
Marital Status (married)		-.65***	-.65***	-.65***	-.65***	-.65***	-.65***
Age at highest education (20+)		-.40***	-.40***	-.40***	-.40***	-.40***	-.40***
Sex (male)		-.64***	-.64***	-.64***	-.64***	-.64***	-.64***
Type of community (rural)		-.58***	-.58***	-.58***	-.58***	-.58***	-.58***
<b>Mobile Web penetration (in %) <sub>a</sub>:</b>			-.07***	-.06***	-.06***	-.07***	-.07***
<b>GDP (current US\$ per capita) <sub>a</sub>:</b>				-0.3*	-.02*	-.04**	-.04**
<b>Gini index (0-100) <sub>a</sub>:</b>					.02+	.02+	.02+
<b>Inflation (annual %) <sub>a</sub>:</b>							-.002
<b>Life expectation (total years) <sub>a</sub>:</b>						.03*	.03+
<b>Unemployment (% of total labor force) <sub>a</sub>:</b>							-.002
<b>Urbanization (% of total) <sub>a</sub>:</b>							-.002
Log likelihood	-245.71	240.77	265.64	268.65	270.00	272.18	272.24
Variance country	.0092	.0110	.0033	.0027	.0025	.0021	.0021
Unexplained variance	.0944	.0327	.0319	.0319	.0318	.0318	.0318
ICC	0.09						
R <sup>2</sup>		0.58	0.66	0.67	0.67	0.67	0.67

\*\*\* p<.001; \*\* p<.01; \* p<.05; + p<.10; a = z-transformed

# Summary

2005-2013:

- Mobile Web bias estimates decrease for the socio-demographic variables „sex“, „age“ and „type of community“
- Landline Internet bias estimates decrease for all five socio-demographic variables

2013:

- In all 27 EU member states bias estimates for the landline Internet population are smaller than bias estimates for the mobile Web population.
- For the socio-demographic variables „marital status“ and „type of community“ seven of the 27 EU member states yield lower bias estimates for the mobile Web population.

Multilevel-Analysis:

- Increasing Mobile Web penetration and GDP as well as low Gini indices and life expectancy  
→ decreasing mobile Web bias estimates

## Further Research:

- Do citizens without mobile phones or mobile phone owners without mobile Web access cause the coverage error?
- Non-response bias

\* \* \* \*

- It is still too early to use mobile Web surveys as a mode of data collection in the European population.
- However, with increasing mobile Web penetration, bias estimates will also decline.
- Thus, in the future mobile Web surveys might become worth considering for survey data collection in the European population.





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**Thank you.**

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# Back Up

RCB Mobileweb vs. 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	LI	LI	LI	LI	MOW	LI
BELGIUM	LI	LI	LI	LI	MOW	LI
BULGARIA	LI	MOW	LI	LI	LI	LI
CYPRUS (REPUBLIC)	LI	LI	LI	LI	LI	LI
CZECH REPUBLIC	LI	LI	LI	LI	LI	LI
DENMARK	MOW	LI	LI	LI	LI	LI
ESTONIA	MOW	LI	LI	LI	LI	LI
FINLAND	MOW	LI	LI	LI	LI	LI
FRANCE	MOW	LI	MOW	LI	LI	LI
GERMANY	LI	MOW	LI	LI	LI	LI
GREECE	LI	LI	LI	LI	LI	LI
HUNGARY	LI	LI	LI	LI	LI	LI
IRELAND	LI	LI	MOW	LI	LI	LI
ITALY	LI	LI	LI	LI	LI	LI

RCB mobile Web <= RCB landline Internet →

MOW

RCB mobile Web > RCB landline Internet →

LI

# Back Up

RCB Mobileweb vs. 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	MOW	MOW	MOW	LI	MOW	LI
LITHUANIA	MOW	LI	LI	LI	MOW	LI
LUXEMBOURG	LI	LI	LI	LI	MOW	LI
MALTA	LI	LI	MOW	LI	LI	LI
NETHERLANDS	LI	LI	LI	LI	LI	LI
POLAND	MOW	LI	LI	LI	MOW	LI
PORTUGAL	LI	LI	MOW	LI	MOW	LI
ROMANIA	LI	LI	LI	LI	LI	LI
SLOVAKIA	LI	LI	LI	LI	LI	LI
SLOVENIA	LI	LI	LI	LI	LI	LI
SPAIN	LI	LI	LI	LI	MOW	LI
SWEDEN	LI	LI	LI	LI	LI	LI
UNITED KINGDOM	MOW	LI	LI	LI	LI	LI

RCB mobile Web <= RCB landline Internet →

MOW

RCB mobile Web > RCB landline Internet →

LI

# 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%