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Effectiveness of incentives in web surveys within mixed-mode systems: An evaluation of errors & costs

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CHALLENGES OF SURVEY INDUSTRY

Contemporary survey industry is faced with two increasingly critical problems:

- declining response rates, and
- growing research costs.

Web surveys:

- a promising alternative due to lower costs, however
- problem of noncoverage and lack of sampling frames
- problem of even lower response rates

Coverage problem of Web surveys

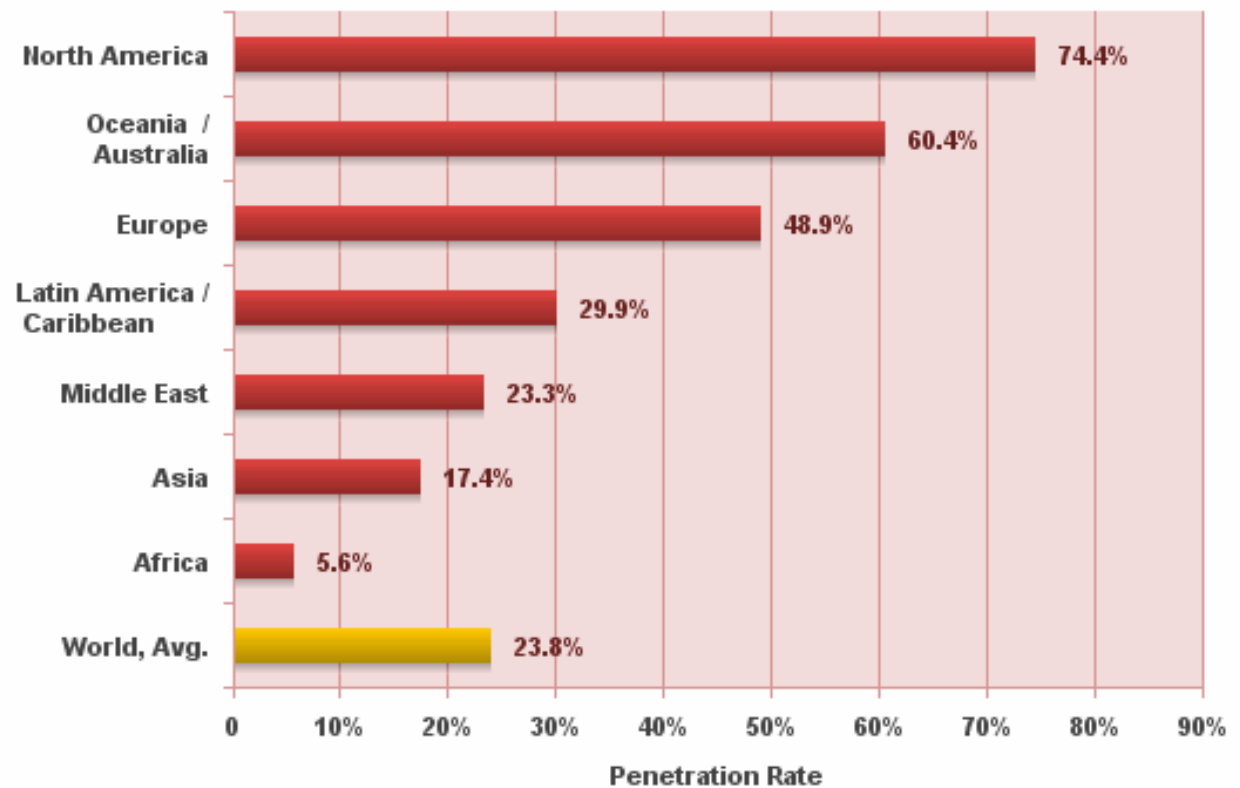
Coverage error:

- part of the population not covered,
- those covered differ from those not covered.

For web surveys:

- not all have access to the Internet;
- non-users different from users: elderly, less educated, lower income, more minorities.

World Internet Penetration Rates by Geographic Regions



Source: Internet World Stats - www.internetworldstats.com/stats.htm
Penetration Rates are based on a world population of 6,710,029,070 and 1,596,270,108 estimated Internet users for March, 2009.
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Nonresponse problem of Web surveys

Meta-analysis of experimental studies comparing Web vs. other survey modes (Lozar Manfreda et al. 2008), limited to list-based samples.

- In 34 out of 45 pair comparisons web survey yielded lower response rate.
- Web surveys yield a lower response rate of about 11% on average (6-16% 95% confidence interval).

Factors influencing response rates in web surveys (Vehovar et al. 2002):

- respondents' characteristics,
- social and technological environment,
- survey design characteristics.

Solutions to coverage and nonresponse problem of Web surveys

Solutions for *coverage problem*:

- probability panels providing non-users with Internet access,
- post survey adjustments for non-coverage,
- **use of Web surveys in mixed-mode survey environment.**

Solutions for *non-response problem*:

- post survey adjustments for non-response
- increasing response rates with appropriate design measures, among them **incentives and mixed-mode designs.**

Research problem

The Problem of Optimization (general):

How to integrate different survey modes and different design solutions in surveys (of general population), so that we simultaneously:

- lower research costs, and
- obtain data of comparable or even higher quality.

Specifically in our study:

How to combine a **web survey** with other survey modes in a **mixed-mode system** and how to **use incentives** in these systems in order to survey the general population, while taking into account expected **costs** and **data quality**?

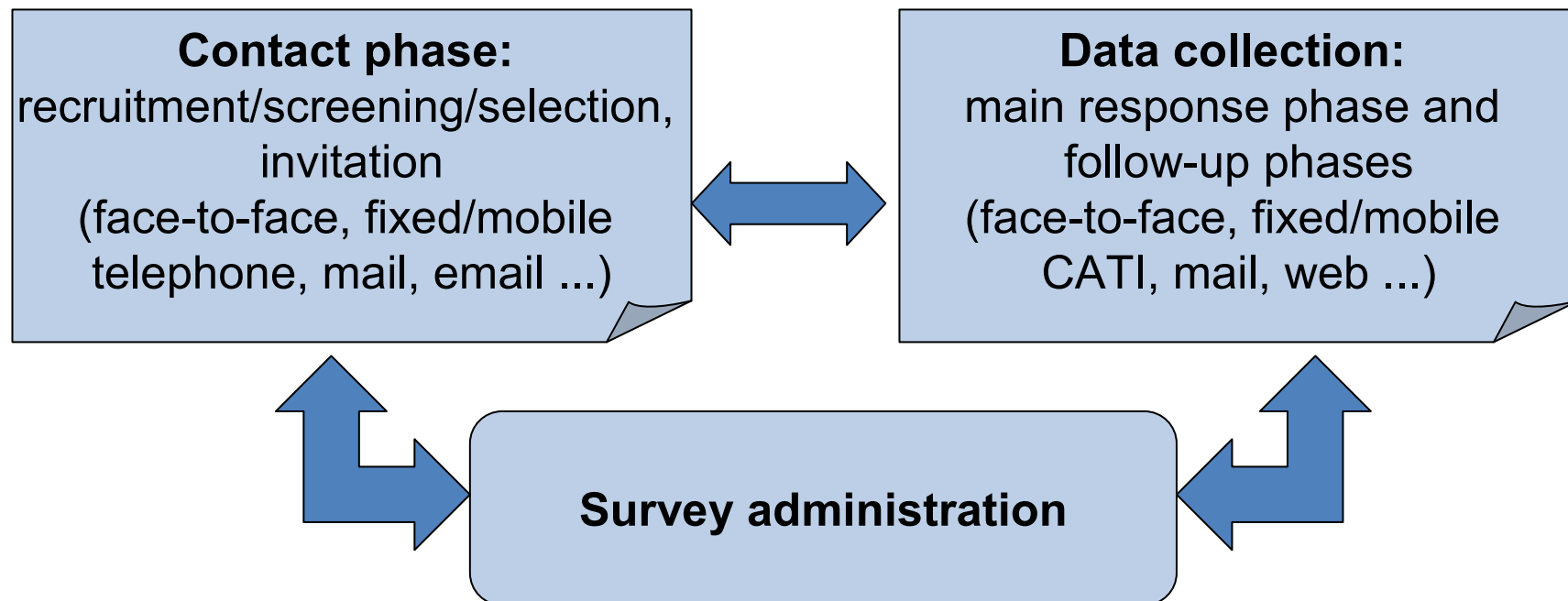
WHAT THIS PRESENTATION IS ABOUT?

- Web mode within mixed-mode survey systems
- Incentives in web surveys
- Case study: finding an appropriate mix of modes and use of incentives.

MIXED-MODE SYSTEMS

In a mixed-mode survey environment more modes and more devices are used simultaneously in one survey to compensate for the weaknesses of each component (de Leeuw, 2005).

A Variety of Combinations: Survey modes can be combined in various ways and on different stages of a survey project: contact phase and data collection phase.



MIXED-MODE SYSTEMS with a Web component

Why integrate Web into mixed-mode systems?

- Usually lower costs.
- Coverage and frame problem.
- Nonresponse problem.
- Measurement problem.

INCENTIVES in web surveys

- Offering some **incentive** for one's time and co-operation in a web survey is **standard**, especially for online panels.
- **Variety of incentives** in web surveys:
 - per capita or lottery,
 - physical or “virtual” incentives,
 - monetary or non-monetary,
 - pre-paid or promised.
- **Effect on participation and other aspects of data quality:** incentive vs. no incentive, type of incentive, value of incentive.

Effect of INCENTIVES on participation

“**Traditional**” survey modes: several meta-analysis showed a positive effect.

What about for **web surveys**?

- A meta-analysis of experimental studies comparing incentive vs. no incentive condition showed positive effect: increased response rate and decreased drop-out rate (Görizt 2006a).
- Loyalty points better than lottery (Görizt 2004).
- Cash lottery better than electronic payment (Bosnjak & Tuten 2003).
- Long-term positive effect: promised monetary incentive (Bosnjak & Tuten 2003, Görizt et al. 2008), loyalty points (Görizt 2008).
- The more valuable incentive, the smaller the drop-out (MacElroy 2000).
- Promised seem to work better in online than in offline studies (Görizt 2006a).
- In non-commercial research intrinsic appeal may work better than incentive (extrinsic appeal) (Tuten et al., 1999/2000).

Effect of INCENTIVES on participation

Caution: the impact of incentive depend on the whole context of a web survey (respondents' characteristics, social and technological environment, a variety of survey design characteristics) and it may not be the most important factor.

Metacontent studies measuring the impact of several factors on response in web surveys with multivariate analysis:

- Lozar Manfreda and Vehovar (2002): incentive decrease drop-out rates while other factors influence participation at other stages of the survey process;
- Cook et al. (2000): incentives associated with lower response rates since used in combination with longer and more tedious surveys.

INCENTIVES – Danger to survey validity?

Non-response error resulting in biased sample of respondents:

- self-selection: incentives attracting particular sample members,
- overstimulation: multiple questionnaires filled in.

Not much empirical evidence: Enander & Sajti (1999), Göritz (2008).

Measurement error:

- + respondents more committed because feeling compensated for their effort → better data quality,
- respondents less committed, only interested in incentive → lower data quality

Not much empirical evidence: Göritz et al. (2008).

CASE STUDY – Rationale

Comparison of web vs. other survey modes often unfair since costs not taken into account.

RQ: If we allocated the budget from a more expensive survey mode to the cheaper web mode and use it e.g. incentives, would this result in comparable results?

Case study:

- Survey of Slovene general population on ICT usage (standardized Eurostat questionnaire).
- Cheaper web survey vs. expensive face-to-face survey?
- In order to overcome coverage error need for web within mixed-mode system.
- Budget savings from the face-to-face survey allocated to incentives in the web survey.
- Are results comparable?

CASE STUDY – Design

Representative sample of individuals of age 18-50 for Central Population Register.

1. Face-to-face (F2F) survey done by Slovenian Statistical Office (SORS) – Eurostat, n=916.
2. Web survey within mixed-mode system: “web + mail” survey

1st wave: mail advance letter with invitation to web questionnaire, mentioning paper follow-up

2nd wave: mail reminder with paper questionnaire, still invitation to web questionnaire

3rd wave: mail reminder

3 experimental conditions:

CONDITION 1, n=167
no incentive

CONDITION 2, n=88
pre-paid, wallet

CONDITION 3, n=85
pre-paid, 5 EUR

Questionnaire: average length 20 min, mostly factual questions, mail and web design as similar as possible.

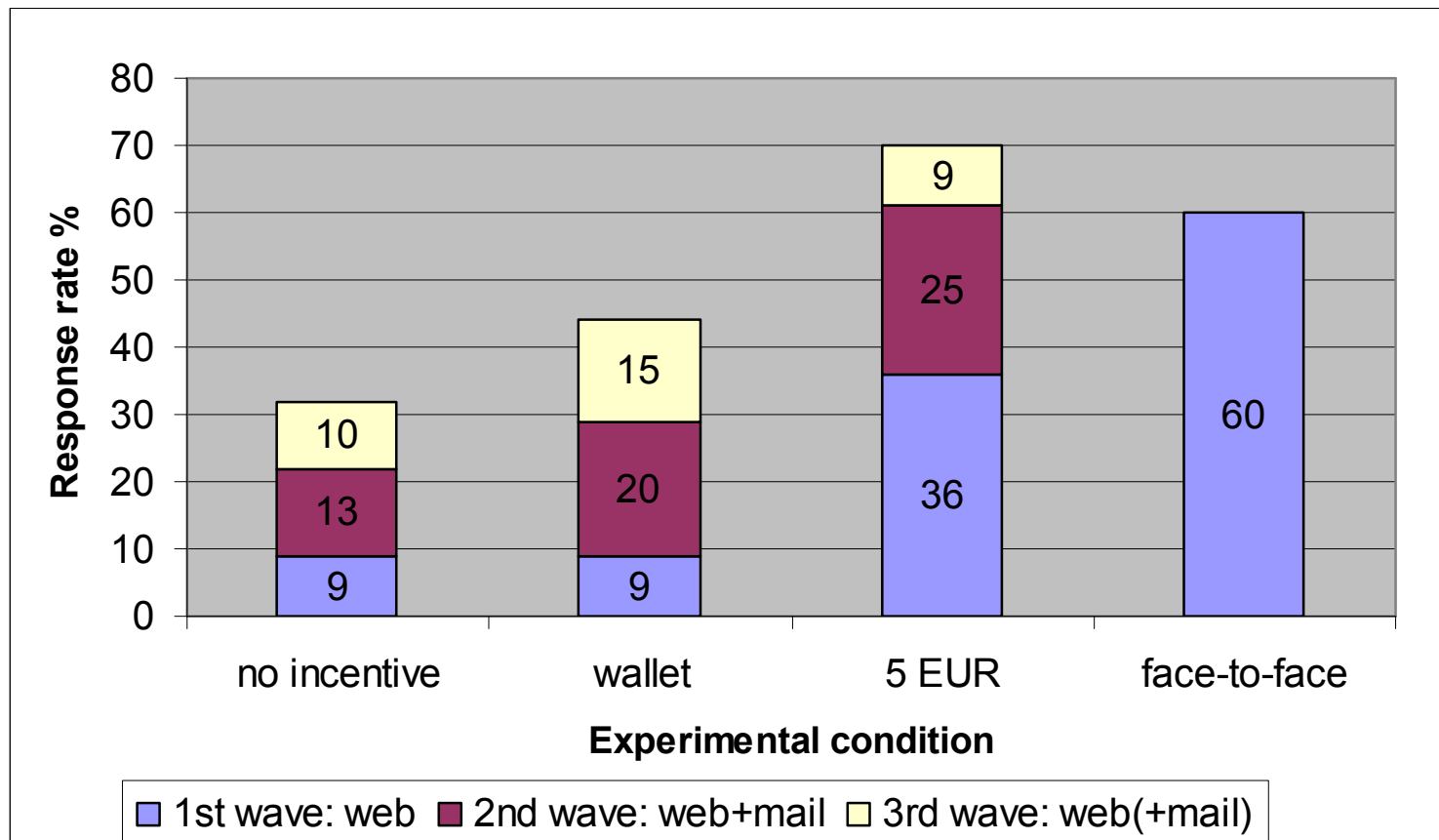
CASE STUDY – Research questions

We compare results from “web+mail” survey with three incentive treatments with the SORS face-to-face survey in order to answer the following questions:

- Response rate: can the “web+mail” with an appropriate incentive treatment obtain comparable results to the SORS F2F survey?
- Is there nonresponse and coverage bias: how final sample compositions of “web+mail” survey with different incentive treatments differ from the SORS F2F data?
- Average bias in survey estimates: what happens with bias of results on average of the web survey if incentives are used and a follow-up in different mode is implemented?
- Costs: what are the costs of different experimental conditions given equal final sample size?
- Cost & error optimization: which combination of modes and incentive conditions perform best in terms of minimized costs and errors?

Response rates: What if we send another reminder?

Response rate: number of respondents / eligible respondents



Final sample composition (bias): effect of incentives

1st wave: web only respondents

	Web+mail						SORS F2F
	No incentive		Wallet		5 EUR		
	1 st wave	Sum	1 st wave	Sum	1 st wave	Sum	
Socio-demographic variables							
% of men	57%	51%	50%	47%	42%	37%	52%
Mean age	30	33	34	34	31	31	35
Mean household size	3,6	3,7	3,9	3,5	3,6	3,6	3,8
Median household monthly income EUR	2.150	1.500	2.000	2.000	2.000	1.700	1.500

No clear pattern: although higher response rate, 5 EUR does not decrease non-response bias

Final sample composition (bias): effect of incentives and adding a mode

Sum: responses from all three waves (web + mail)

	Web+mail						SORS F2F
	No incentive		Wallet		5 EUR		
	1 st wave	Sum	1 st wave	Sum	1 st wave	Sum	
Socio-demographic variables							
% of men	57%	51%	50%	47%	42%	37%	52%
Mean age	30	33	34	34	31	31	35
Mean household size	3,6	3,7	3,9	3,5	3,6	3,6	3,8
Median household monthly income EUR	2.150	1.500	2.000	2.000	2.000	1.700	1.500

- After reminders:
- no incentive condition non-response bias decreases
 - both incentive conditions non-response no pattern

Substantive results: bias in responses

Standardized bias for every item: $bias(p) = \frac{p - \pi}{\pi(1 - \pi)}$

“True” value (π): SORS F2F data

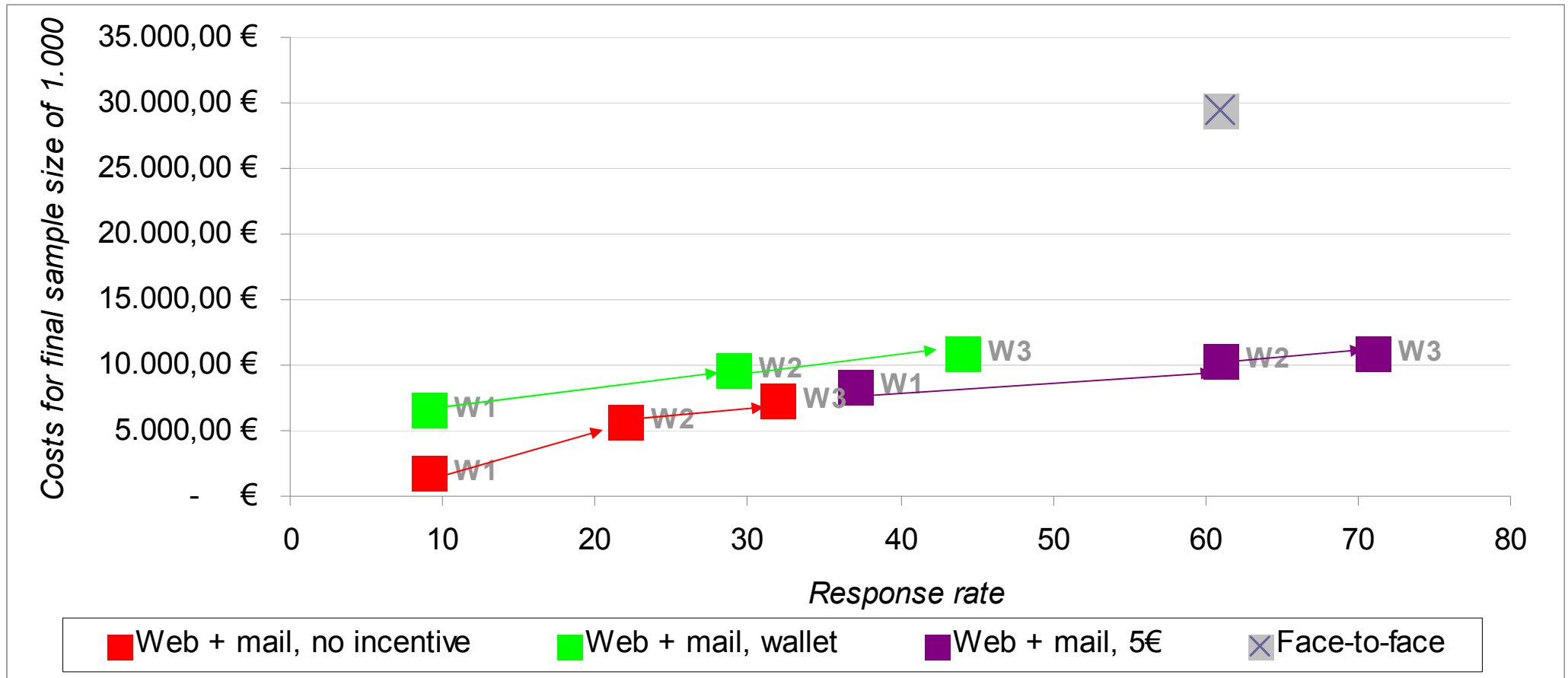
	Web+mail					
	No incentive		Wallet		5 EUR	
	1 st wave	Sum	1 st wave	Sum	1 st wave	Sum
Average standardized bias for proportions	1,36	0,87	0,39	0,42	1,41	1,11

Incentive only not necessarily decrease bias.

Combined “5 EUR + follow-up” increase bias, while “no incentive + follow-up” decrease bias.

Response rate & costs: effect of incentives and additional mode

After all three waves

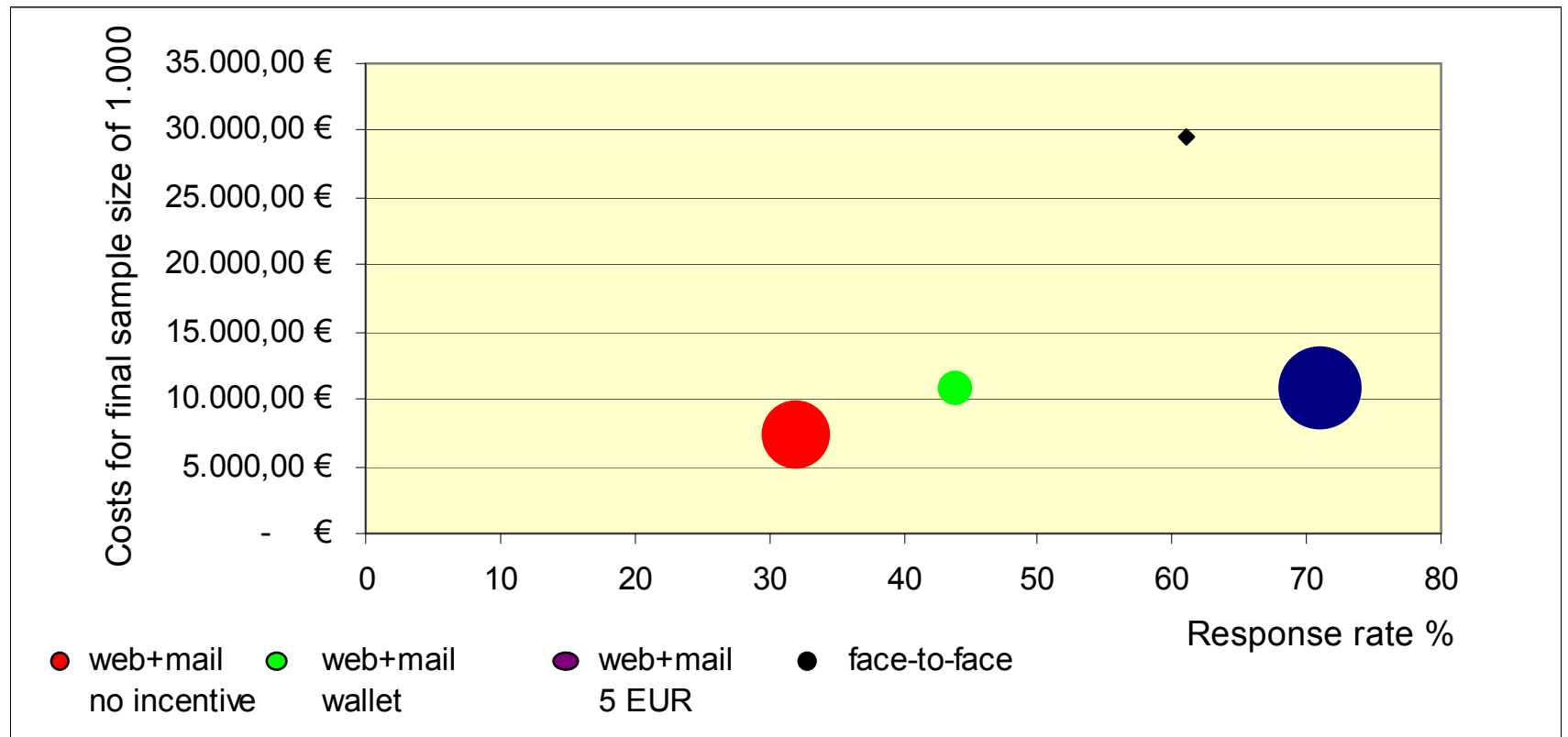


Response rate & costs & bias

Response rate: respondents/eligible

Costs: costs for final sample size of 1.000

Bias: average standardized bias across items



Research problem: OPTIMIZATION PROBLEM

The Problem of Optimization (general):

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OPTIMIZATION PROBLEM: errors

Survey Errors

Different types of sampling and nonsampling errors need to be taken into account: sample variance (depending on sample size) and bias.

Root Mean Squared Error

$$RMSE(\bar{y}) = \sqrt{MSE(\bar{y})} = \sqrt{Var(\bar{y}) + Bias^2(\bar{y})}$$

Some problems of RMSE estimations:

- No separation of different types of errors.
- Obtaining the true population value.
- Identification of key variables.

OPTIMIZATION PROBLEM: costs

Estimation of Costs

Separately for each solicitation and data collection mode (m) in each wave (k).

General Cost Model

Fixed costs

Solicitation costs

Data collection costs

$$c_0 + \sum_{k=1}^K \sum_{m=1}^M (c_{0_{k,m}} + c_{k,m} \cdot n_{k,m}) + \sum_{k=1}^K \sum_{m=1}^M (a_{0_{k,m}} + a_{k,m} \cdot r_{k,m})$$

Fixed costs

c_0 : initial

$c_{0_{k,m}}$: solicitation costs

$c_{0_{k,m}}$: data collection

Variable costs:

$c_{k,m}$: solicitation

$a_{k,m}$: solicitation

$n_{k,m}$: contacted units

$r_{k,m}$: respondents

COST & OPTIMIZATION APPROACHES

Optimization

It is possible to identify the most optimal survey design in several ways, for example by observing which design provides:

1. The lowest cost at required fixed RMSE of a target survey variable.
2. **The lowest RMSE of a target survey variable at fixed costs.**
3. The lowest product of costs and RMSE of a target survey variable at fixed initial or final sample size.

Variables:

- age,
- household size,
- % daily internet users.

COST & OPTIMIZATION APPROACHES: What can we do for 5.000 EUR?

Example: “age”

Survey design	Initial (eligible) sample size	Response rate	Final sample size	Mean	Bias	RRMSE	Costs (€)
web+mail, no incentive	2057	32%	653	32,65	-2,78	0,085861	5.000,00 €
web+mail, wallet	976	44%	426	34,23	-1,2	0,037453	5.000,00 €
web+mail, 5 EUR	606	70%	427	31,47	-3,96	0,126567	5.000,00 €
Face-to-face	259	61%	157	35,43	0	0,0215995	5.000,00 €

COST & OPTIMIZATION APPROACHES: What can we do for 5.000 EUR?

Example: “household size”

Survey design	Initial (eligible) sample size	Response rate	Final sample size	Mean	Bias	RRMSE	Costs (€)
web+mail, no incentive	2057	32%	653	3,73	-0,05	0,02044	5.000,00 €
web+mail, wallet	976	44%	426	3,47	-0,31	0,091035	5.000,00 €
web+mail, 5 EUR	606	70%	427	3,62	-0,16	0,046477	5.000,00 €
Face-to-face	259	61%	157	3,78	0	0,0258147	5.000,00 €

COST & OPTIMIZATION APPROACHES: What can we do for 5.000 EUR?

Example: “% daily Internet users”

Survey design	Initial (eligible) sample size	Response rate	Final sample size	Mean	Bias	RRMSE	Costs (€)
web+mail, no incentive	2057	32%	653	0,75	0,15	0,150954	5.000,00 €
web+mail, wallet	976	44%	426	0,71	0,11	0,112175	5.000,00 €
web+mail, 5 EUR	606	70%	427	0,83	0,23	0,230717	5.000,00 €
Face-to-face	259	61%	157	0,6	0	0,0390981	5.000,00 €

CONCLUSIONS

Declining response rates and growing costs for survey research together with possibilities and limitations of web surveys increasing require combining different modes in an optimal way.

Optimization: taking into account costs and errors.

RQ: Can web be used to survey the general population if combined with another mode and if the advantage of lower costs is used?

Key findings:

- Incentive 5 EUR increase response rate.
- Follow-up increase response rate, especially if combined with incentives.
- Incentive 5 EUR does not necessarily decrease bias.
- Follow-up decrease bias when no incentives are involved.
- Cost & error optimization: different conclusions for different key variables, depending mostly on bias.
- For fixed budget: face-to-face the best, especially for variables sensitive to coverage error.

CONCLUSIONS

IN GENERAL: HOW TO DECIDE ABOUT THE OPTIMAL DESIGN?

- Response rate should not be the only criteria, it is not necessarily good indicator of bias.
- Comparison of response rates accors designs without costs not fair.
- Simultaneous integration of costs and bias determine the optimality.
- Conclusions may be different for different key variables with bias being the most sensitive parameter.