Representativity Indicators for Survey Quality

R-indicators and fieldwork monitoring

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Outline

- Basic ingredients for R-indicators
- Basic ingredients for fieldwork monitoring using R-indicators
- R-indicators in action: sample unit re-selection for additional fieldwork efforts
  - Three selection strategies
  - Simple example
  - ESS3 - Belgium

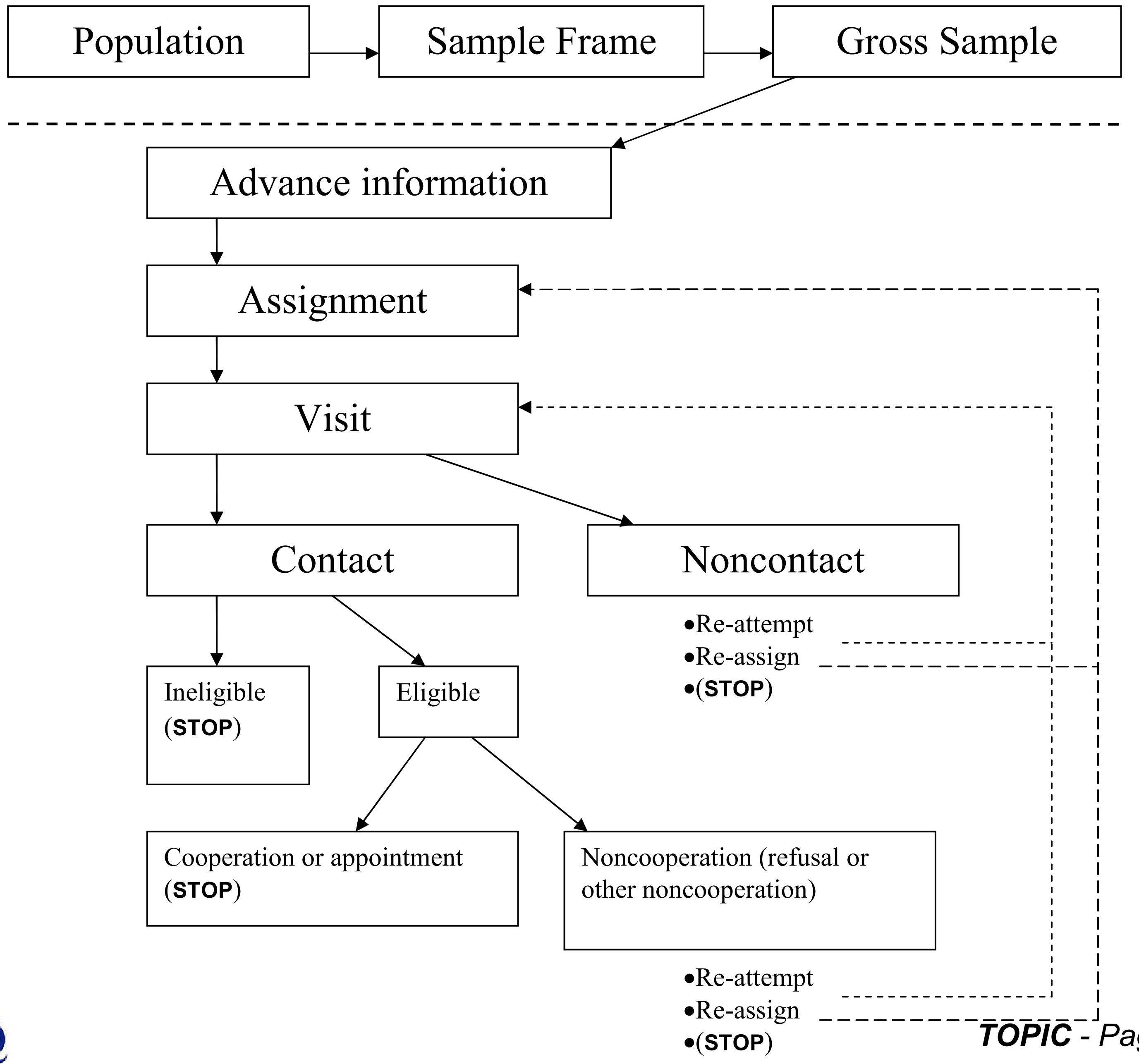
Basic ingredients for R-indicators

- 0 – 1 response indicator
- Auxiliary variables, usually (non)respondent related
- Determine response propensities ρ_i
- Determine $S(\rho)$ and R-indicator (and maximal absolute bias)
- E.g. ESS3 – Belgium
  - Response rate: 0.62 (ineligibles excluded)
  - R-indicator: 0.79
  - Maximal absolute bias: 0.17
  - Auxiliary variables include age, gender, type and condition of dwelling and several indicators on municipality level
- But: only a result of a process

Basic ingredients for fieldwork monitoring using R-indicators

- We need to look inside the fieldwork process
- Fieldwork process is layered:
  - Making contact
  - Assess eligibility
  - Is target person able / available?
  - Is target person willing to cooperate?
- During these fieldwork phases, many decisions have been made by fieldwork management and interviewers (=treatment variables)
  - Selection, training, allocation and remuneration of interviewers
  - Timing and modes of contact attempts
  - Re-selection of sample units for renewed attempts
  - …

Example flowchart of fieldwork ESS3 - Belgium



Basic ingredients for fieldwork monitoring using R-indicators

- Flowchart inspires to deconstruct the fieldwork into basic building stones
  - Sub-processes
  - Treatment variables
  - Necessity of paradata
- Fieldwork can be monitored / evaluated
  - How did the combination of treatment variables affect the quality of the obtained sample?
  - During / at the end of process
- Inspire future quality improvements
  - During the current fieldwork (adaptive design)
  - For the next survey

R-indicators in action: sample unit re-selection for additional fieldwork efforts

- Renewed contact attempt require substantial efforts, usually at lower success rates

- Not all cases are reissued

- Who should be re-selected in order to improve sample quality
  - Random selection among initial nonrespondents
  - Selection of high propensity cases
  - Selection of low propensity cases

- Two applications:
  - Simple imaginary example
  - Real application: ESS3 - Belgium

A simple example

- Suppose a sample of n=10.000 cases
- Auxiliary variable *X* (mean = 0, stdev = 1)
- Every unit *i* has been attempted once
- Initial response propensities are determined by:

$$ln\left(\frac{response=1}{response=0}\right)=0+0.5x$$

- Sample quality after initial attempt:
  - Response rate = 50%
  - R-indicator = 0.77
  - Maximal absolute bias = 0.23

A simple example

- Of the 5.000 nonrespondents, 2.500 can be reissued
- For each nonresponding unit *i* we have an expectation about the conversion success, based on the initial attempt
- We assume:

$$ln\left(\frac{conversion = 1}{conversion = 0}\right) = -1 + 0.5x$$

A simple example

Expectations about effect of purposive re-selection

Propensity selection	Response rate	R-indicator
Low	+	++
Random	++	?
High	+++	--

A simple example

After 50 replications

	Initial		High	Random	Low
Response rate	0.5012		0.5841 ☺	0.5646	0.5424 ☹
R-indicator	0.7674		0.6575 ☹	0.7540	0.8466 ☺
Maximal absolute bias	0.2321		0.2932 ☹	0.2178	0.1414 ☺

A simple example

- Variety of quality arrangements, depending on the selection strategy.

- Low propensity selection ➔ best return on investment
  - Less effort for same quality
  - Better quality for same effort

- Conditions
  - Auxiliary variables should be a good approximation of $\aleph$
  - Prior knowledge of auxiliary variables
  - Caution: low propensity selection can lead to inverse effects

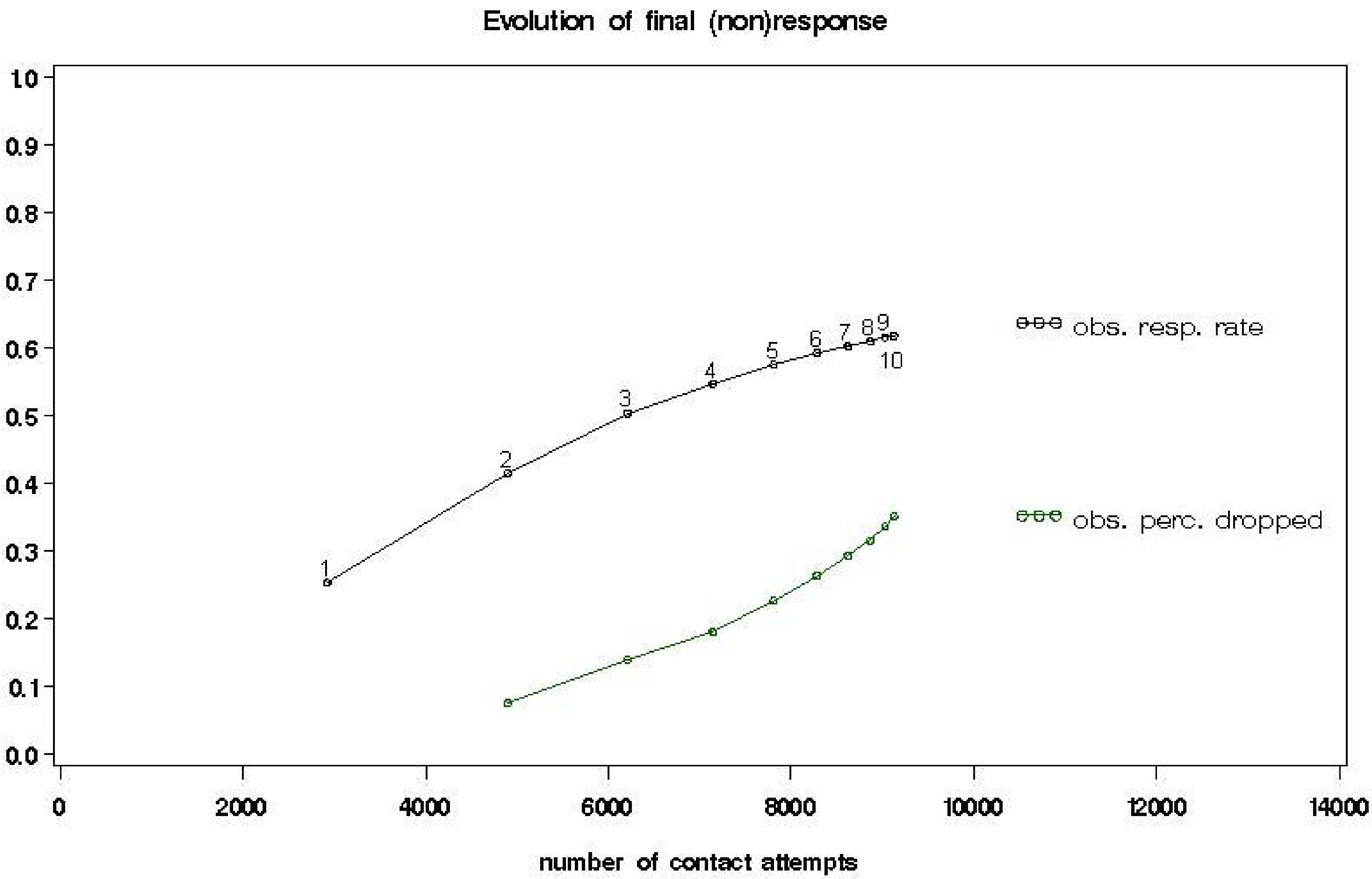
Empirical validation: ESS3 - BE

- 2927 eligible cases

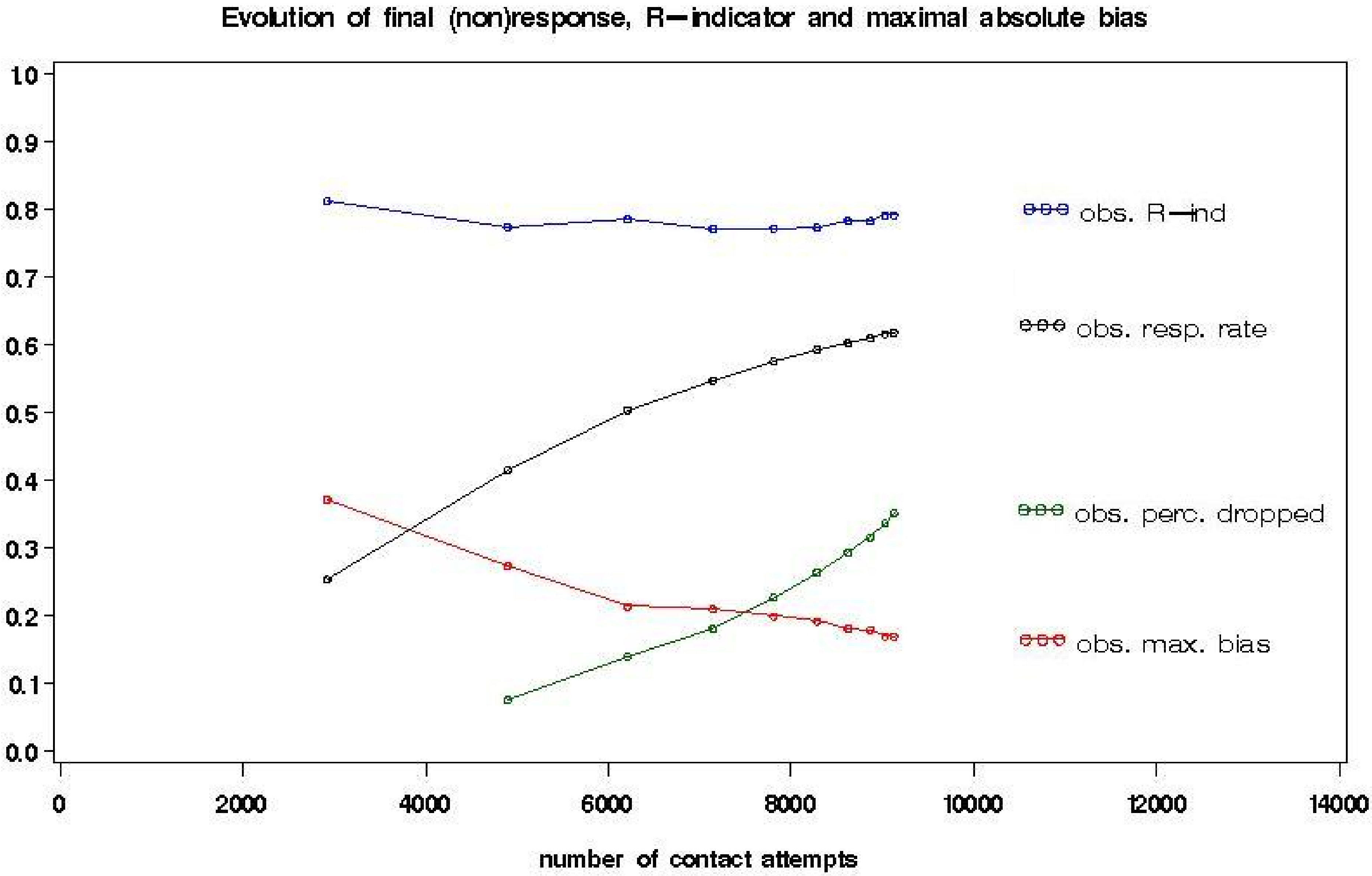
- Auxiliary information, known after the first contact attempt:
  - Age, gender, type of dwelling, housing conditions
  - Information on municipality level: average income, population density, percentage of foreigners

- Display evolution of sample quality as a function of total number of contact attempts (efforts)

- Then simulate according to three selection strategies
  - Propensities determined after first attempt
  - All other fieldwork conditions constant


Evolution of final (non)response
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
2000
4000
6000
8000
10000
12000
14000
number of contact attempts
1
2
3
4
5
6
7
8
9
10
obs. resp. rate
obs. perc. dropped

RISQ


Evolution of final (non)response, R-indicator and maximal absolute bias
1.0
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0.5
0.4
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0.2
0.1
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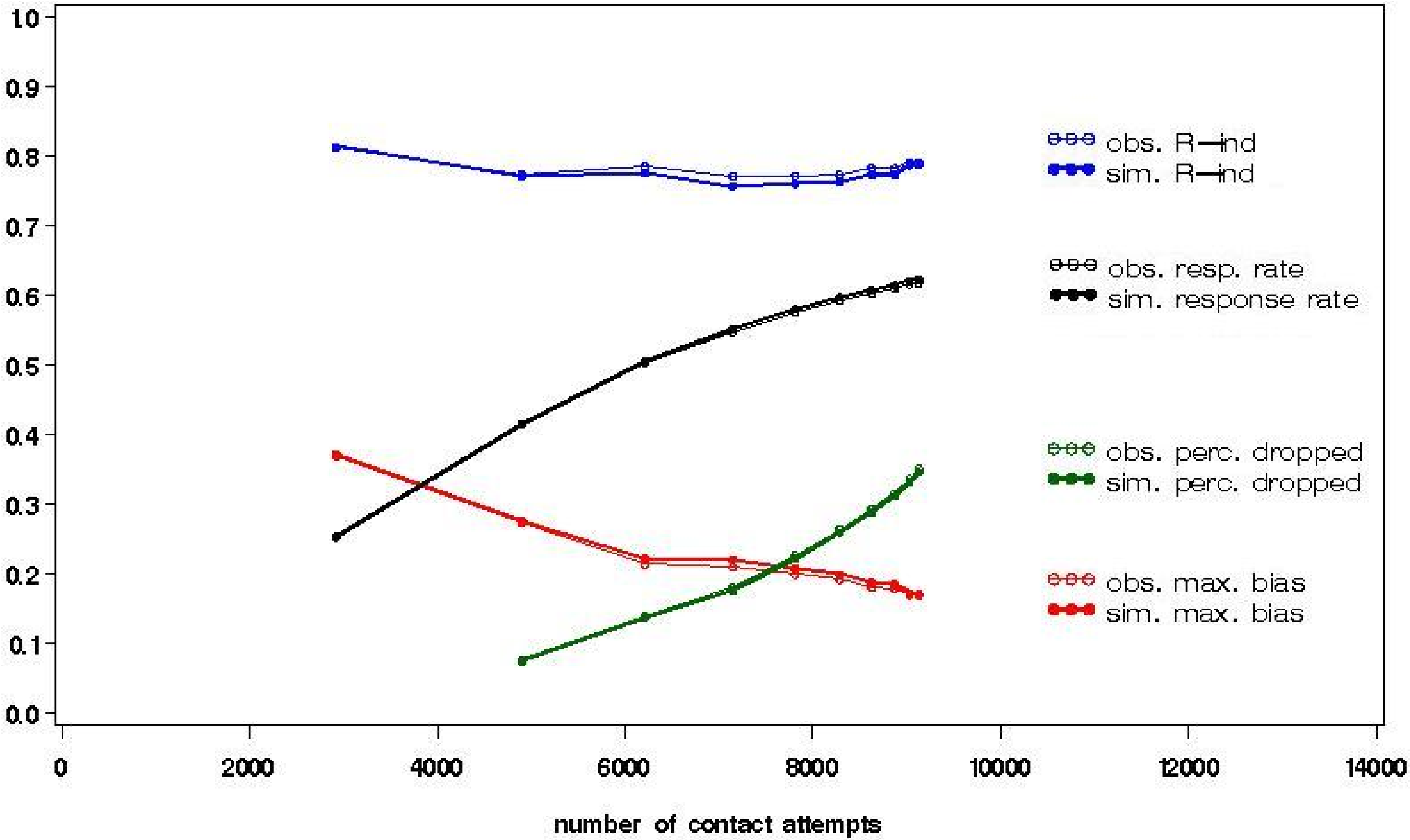
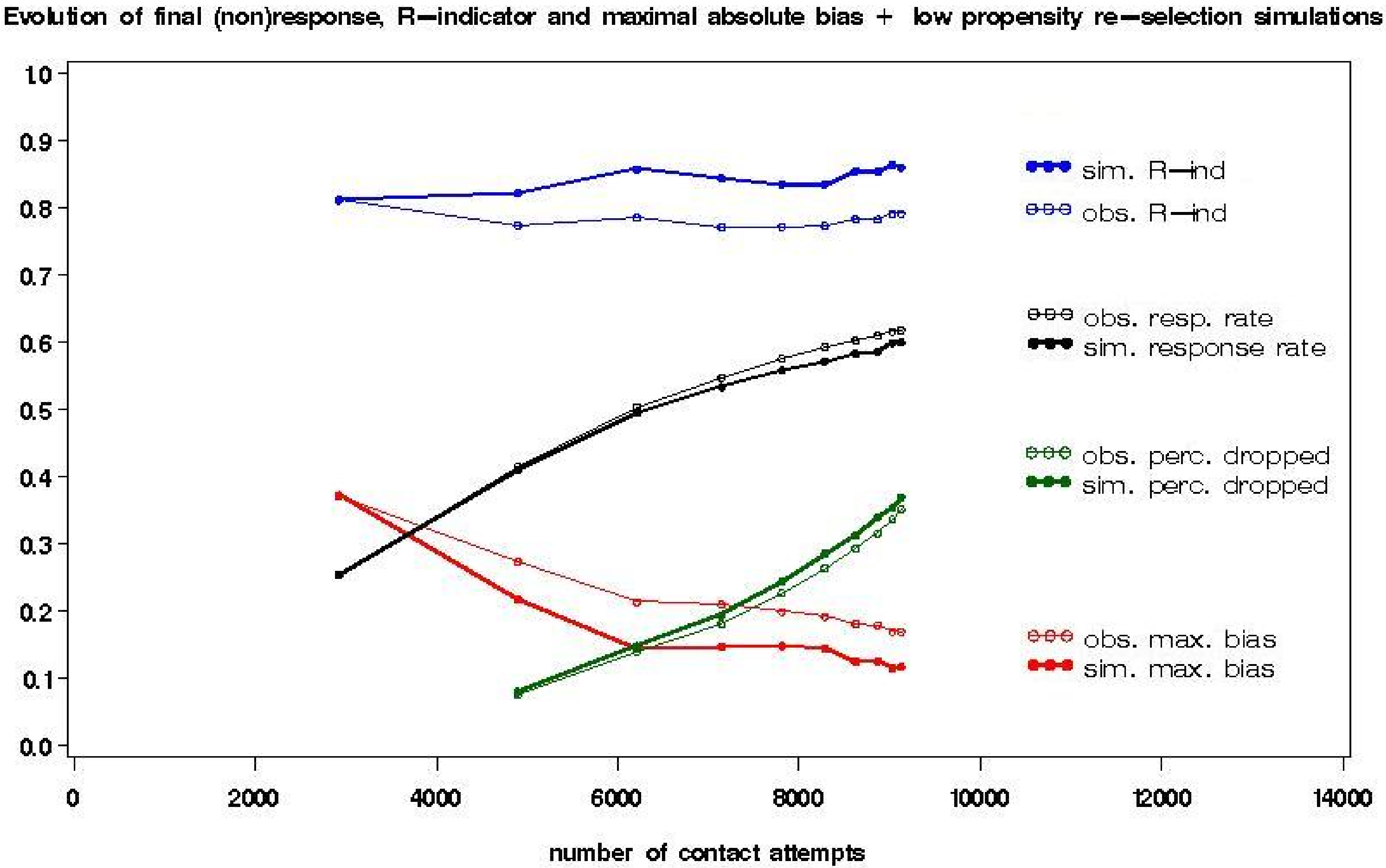
0
2000
4000
6000
8000
10000
12000
14000
number of contact attempts
obs. R-ind
obs. resp. rate
obs. perc. dropped
obs. max. bias

Evolution of final (non)response, R—indicator and maximal absolute bias + random re—selection simulations




Evolution of final (non)response, R–indicator and maximal absolute bias + low propensity re–selection simulations
1.0
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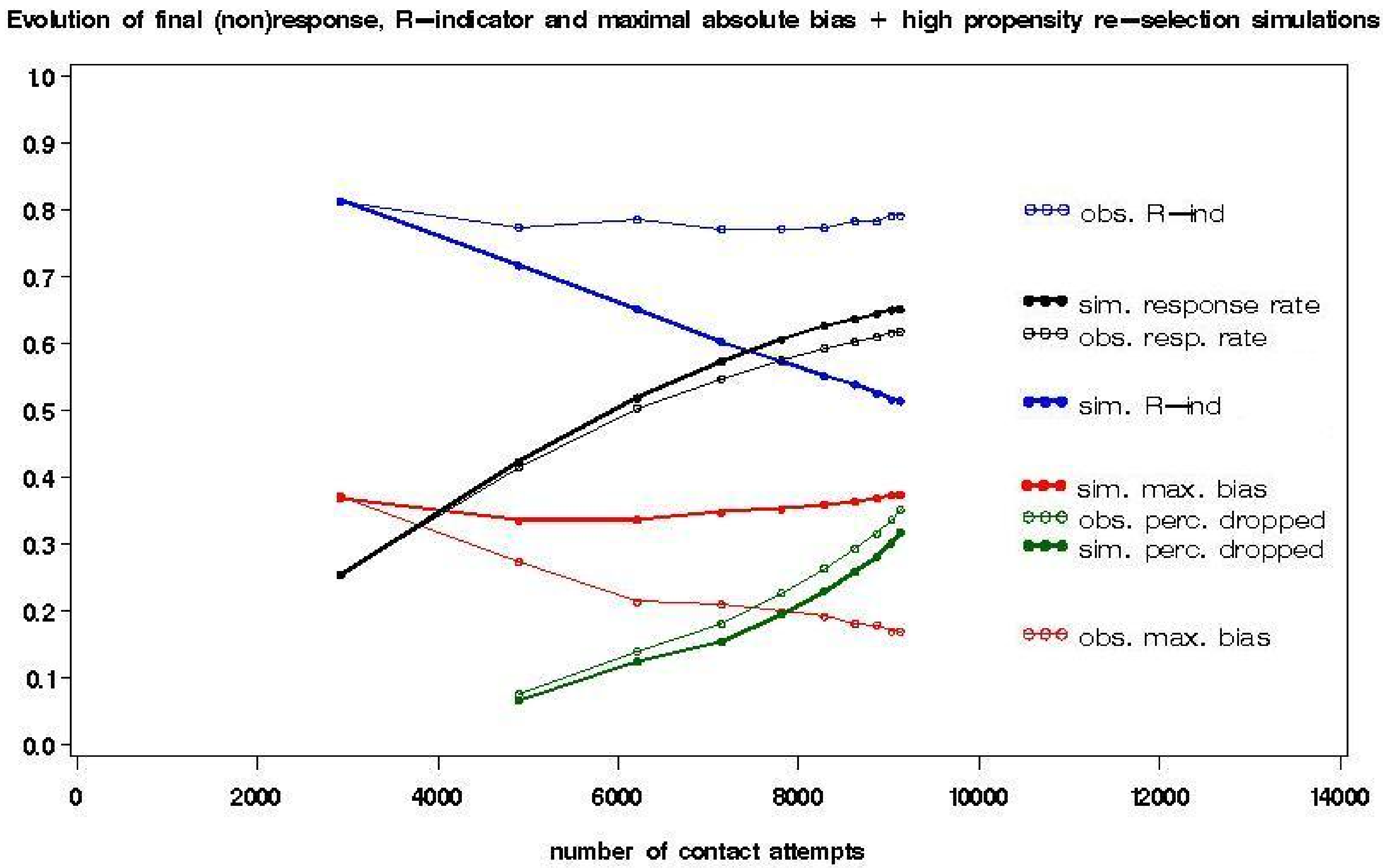
number of contact attempts
sim. R–ind
obs. R–ind
obs. resp. rate
sim. response rate
obs. perc. dropped
sim. perc. dropped
obs. max. bias
sim. max. bias


Evolution of final (non)response, R−indicator and maximal absolute bias + high propensity re−selection simulations
1.0
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12000
14000
number of contact attempts
obs. R−ind
sim. response rate
obs. resp. rate
sim. R−ind
sim. max. bias
obs. perc. dropped
sim. perc. dropped
obs. max. bias

Empirical validation: ESS3 - BE

- Purposive selection can be cost-efficient, when selecting low propensity cases
  - Less efforts or
  - Better quality

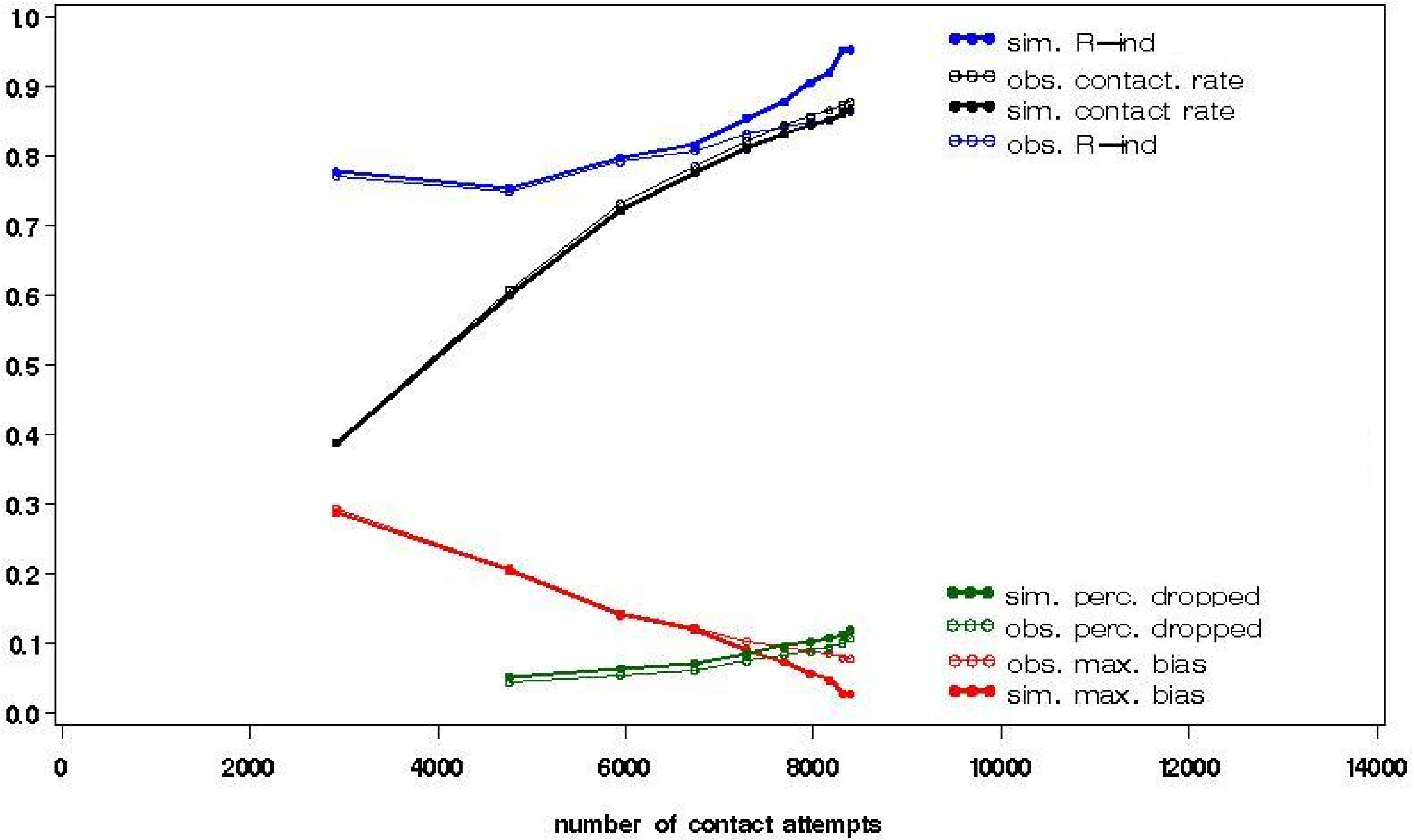
- Part of the efforts that are saved can be invested in the collection of more auxiliary variables
  - Area information
  - Ask the neighbours
  - Google streetview
  - …
  - Privacy restrictions!!!

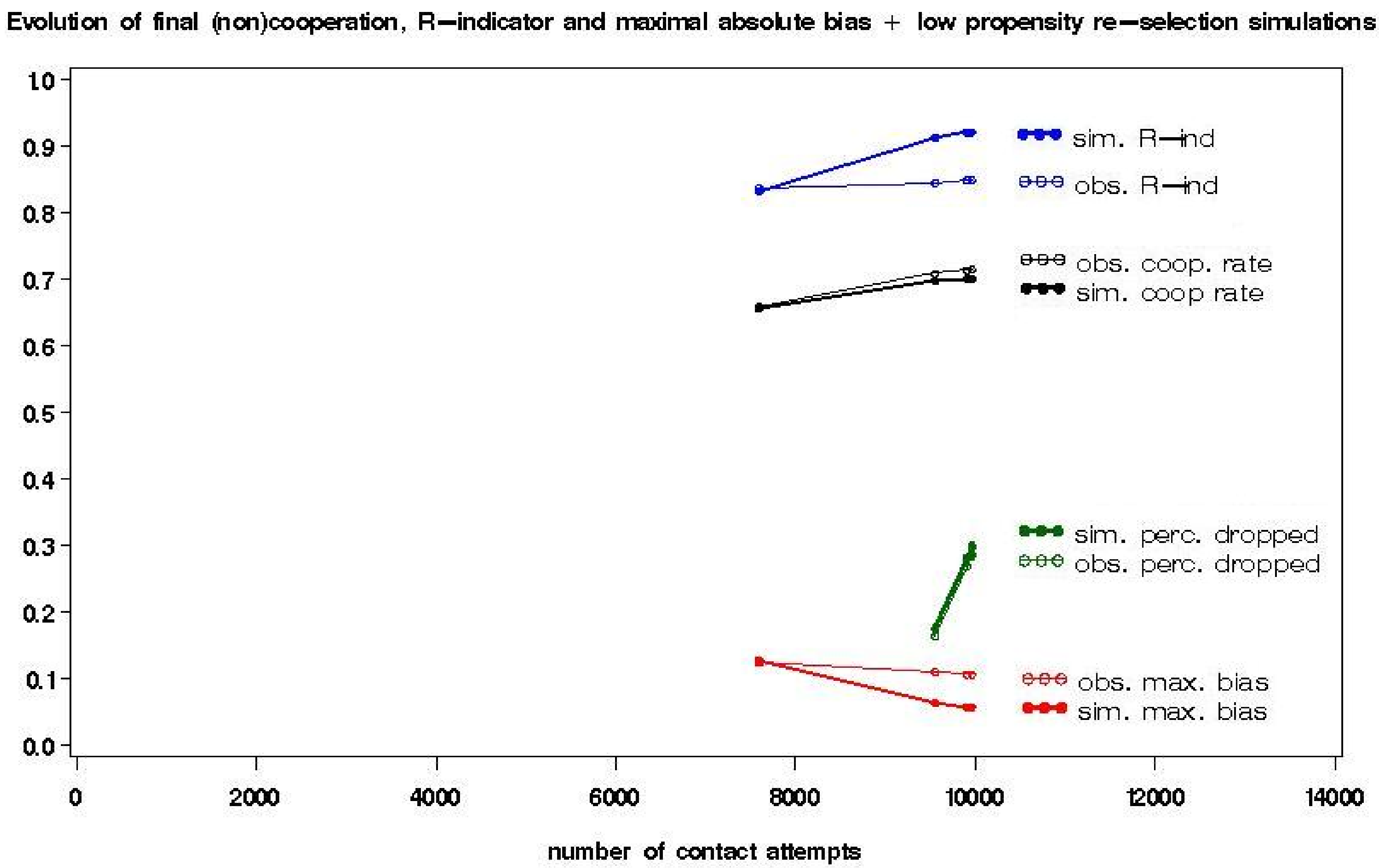
Empirical validation: ESS3 - BE

- It is possible to disentangle contact and cooperation and evaluate both processes separately
    - Contact: until decision to cooperate / refuse
    - Cooperation: decision to cooperate / refuse

- Comparing low propensity selection to observed evolution
    - Both processes seem to leave some space for quality improvement
    - Particularly cooperation / refusal

Evolution of final (non)contact, R−indicator and maximal absolute bias + low propensity re−selection simulations




Evolution of final (non)cooperation, R−indicator and maximal absolute bias + low propensity re−selection simulations
1.0
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0.0
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2000
4000
6000
8000
10000
12000
14000
number of contact attempts
sim. R−ind
obs. R−ind
obs. coop. rate
sim. coop rate
sim. perc. dropped
obs. perc. dropped
obs. max. bias
sim. max. bias

Fieldwork monitoring – concluding remarks

- R-indicator facilitates fieldwork monitoring
  - R-indicator is single-value
  - Response propensity is summary of multivariate distribution
- R-indicator inspires fieldwork improvement and efficiency
  - May save a lot of redundant efforts
  - Invest efforts in good auxiliary information
- Fieldwork monitoring as such is very complex process
  - Requires complex models
  - Requires good paradata