Pre-Call Validation of RDD Cell Phone Numbers.
Results from a field experiment.

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Outline

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Background
RDD cell phone numbers

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- Cell phone surveys are gaining in importance due to the increasing proportion of cell phone-onlys

- The usage of random digit dialing (RDD) cell phone samples as a standard method

- Problem of RDD cell phone numbers:
  - High proportion of invalid numbers
  - High proportion of numbers of unknown eligibility

Methods of pre-call validation

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text messaging	number validation
Detailed reason codes in case of failed delivery	Differentiation of valid, invalid or not logged in for a longer time
Bulk messages	Home Location Register (HLR) lookup
Relatively expensive ($ 0,12)	Inexpensive ($ 0,05)
Delivery-attempt up to 48 hours	Snapshot, immediately available
Prenotification	No message to respondent

Research Questions

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1. Can survey costs be reduced by means of pre-call validation?

    - Can contact rates and interview success rates be increased?

    - Is there a reduction of the mean number of call attempts and mean call duration per interview?

2. How is data quality affected?

    - Can response rates be calculated more reliable by decreasing the share of numbers of unknown eligibility?

    - What is the proportion of false negative numbers, which are falsely excluded although being valid cell phone numbers?

Methods

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- Field-experimental study
- Recruitment interviews for "Experimental Mobile Phone Panel" in Germany (September 2010 - January 2011):
  $N_{initial}$ = 24,999, N_{final} = 17,444
- Sampling according to Gabler-Häder design
- Up to 15 call attempts
- Response Rate (AAPOR RR3):
  - without text message: 16%
  - with text message: 19%

Study Design
Experimental conditions

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	1st check	2nd check	text mes-sage	screening out conditions	initial sample (N)	screened out (%)	final sample (N)
CG 0	-	-	-	-	6,200	-	6,200
EG 1	✓	-	-	number unknown	2,250	42	1,295
CG 1	✓	-	-	-	1,025	-	1,025
EG 2	✓	✓	-	number unknown	2,250	42	1,307
CG 2	✓	✓	-	-	1,025	-	1,025
EG 3	-	-	✓	subscriber unknown	2,500	50	1,238
EG 4	-	-	✓	subscriber unknown/absent	2,500	70	753
CG 3/4	-	-	✓	-	1,125	-	1,125
EG 5	✓	-	✓	number unknown & subscriber unknown	2,500	42	1,440
EG 6	✓	-	✓	number unknown/not logged in & subscriber unknown/absent	2,499	64	911
CG 5/6	✓	-	✓	-	1,125	-	1,125
total					24,999		17,444

Results

Percentage of valid numbers, contact & interview rate

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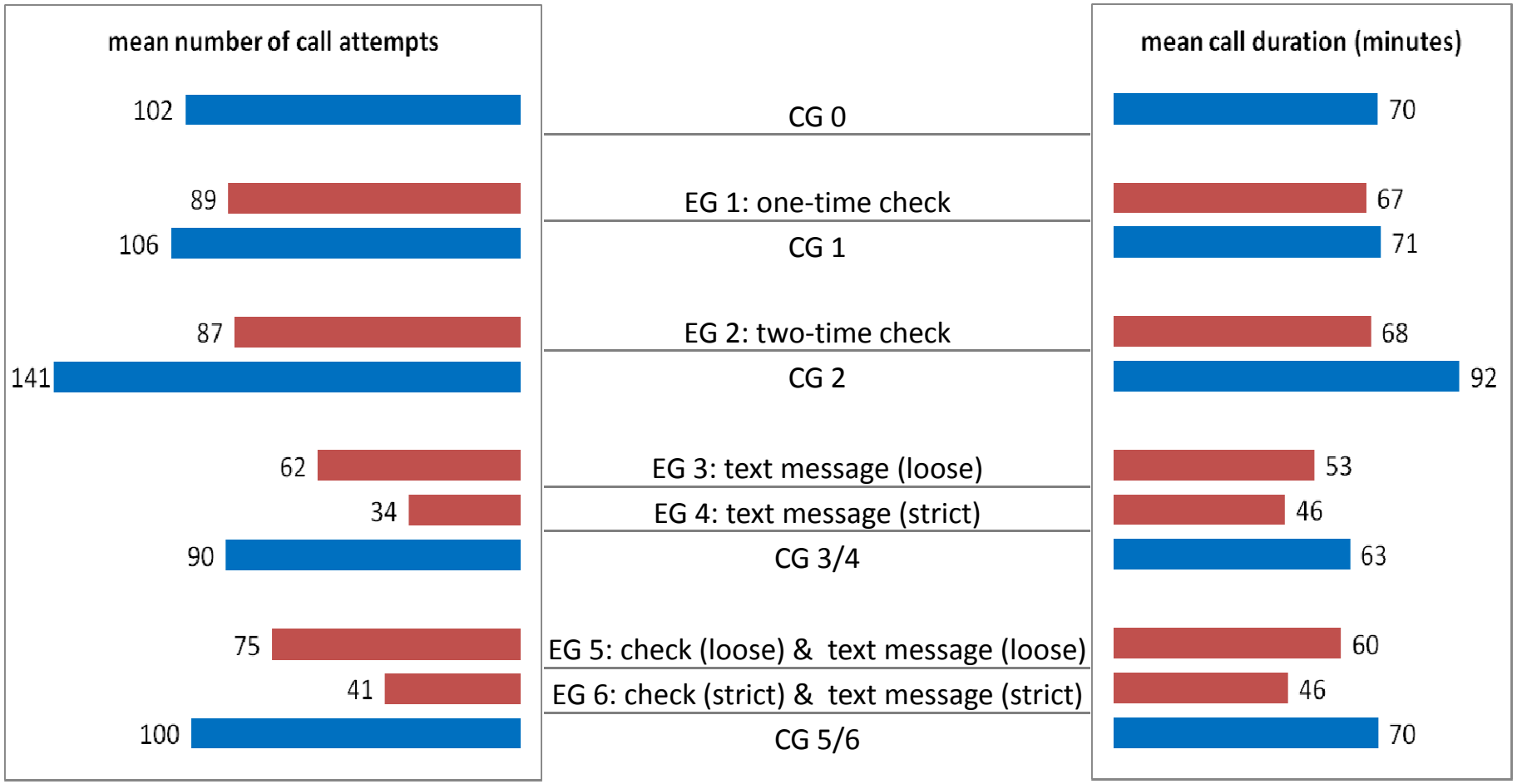
	screening out conditions	valid numbers (%)	contact rate (%)	interview rate (%)
CG 0	-	53	28	6
EG 1	one-time check	92	49	10
CG 1	-	56	26	6
EG 2	two-time check	89	49	10
CG 2	-	51	26	4
EG 3	text message (loose)	91	52	14
EG 4	text message (strict)	98	80	20
CG 3/4	-	54	28	7
EG 5	check (loose) & text message (loose)	88	49	11
EG 6	check (strict) & text message (strict)	90	68	18
CG 5/6	-	53	28	7
total		68	39	9

Notes: Calculations are based on experimental and control groups, respectively; red marked calculations are based on control groups.

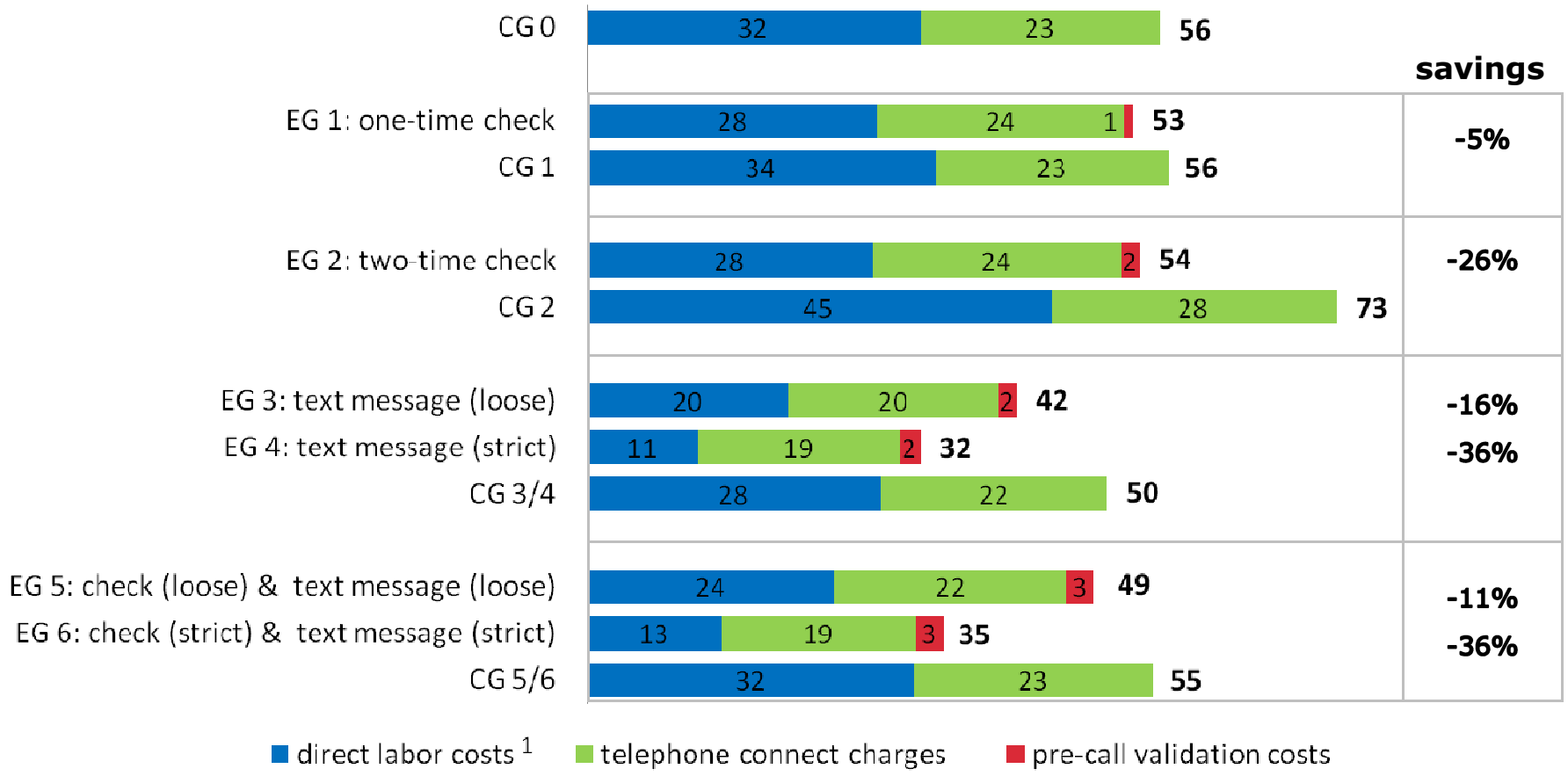
Results

Call attempts & duration per completed interview



Results

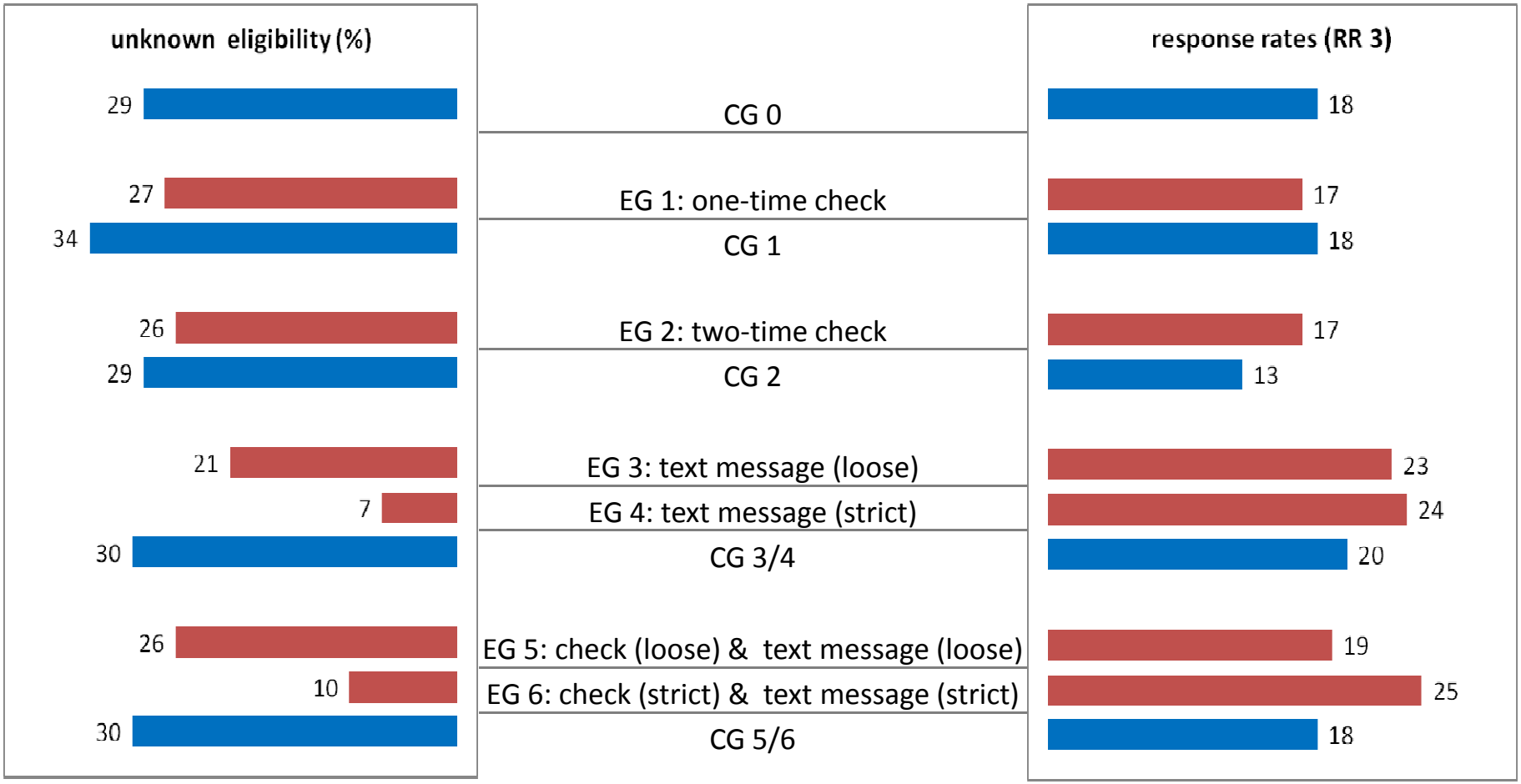
Costs per completed interview (US$)



Notes: All calculations per completed interview; [1)] Costs for interviewer and supervisor.

Results

Percent of "unknown eligibility" & response rates



Results
False negatives

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	screening out conditions	false negatives % (N)	final disposition codes (AAPOR) (%)			
			interview	eligible, non-interview	unknown eligibility, non-interview	not eligible
CG 1	one-time check	**5** (22)	-	0.2	5	-
CG 2	two-time check	**3** (13)	-	0.5	3	-
CG 3	text message (loose)	**19** (106)	0.7	2	16	0.4
CG 4	text message (strict)	**36** (281)	1	4	31	0.4
CG 5	check (loose) & text message (loose)	**4** (21)	0.4	1	3	-
CG 6	check (strict) & text message (strict)	**33** (238)	0.6	3	29	0.1

Note: Calculations are based on control groups.

Results
Bias due to false negatives

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	screening out conditions	false negatives % (N)	Bias due to false negatives age		gender	
CG 1	one-time check	**5** (22)	0.6	*n.s.*	0.0	*n.s.*
CG 2	two-time check	**3** (13)	0.0	*n.s.*	0.0	*n.s.*
CG 3	text message (loose)	**19** (106)	0.6	*n.s.*	0.3	*n.s.*
CG 4	text message (strict)	**36** (281)	0.4	*n.s.*	0.6	*n.s.*
CG 5	check (loose) & text message (loose)	**4** (21)	0.9	*n.s.*	1.3	*n.s.*
CG 6	check (strict) & text message (strict)	**33** (238)	0.3	*n.s.*	1.7	*n.s.*

Note: Calculations are based on control groups.

Result overview

Effects of number validation and/or text messaging

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1. Increase of the percentage of valid cell phone numbers in the field up to 90% or even more

2. Decrease of the interviewers' workload regarding mean number of call attempts and mean call duration per complete

3. Reduction of unknown eligible numbers is reflected in an increase of response rates

4. Proportion of false negatives is small and produces no biases

Conclusions

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- Number validation and text messaging are both appropriate methods to increase the percentage of working numbers in the field
- The additional cost for second number check is not justified
- Pre-call validation using text message return codes achieves the greatest savings, but at the expense of tremendously high percentages of false negatives

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Thank you.

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