

The Impact of Invitation Mode on Participation in an Online Establishment Survey

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- Strategies that maximize participation in Web-only surveys are in high demand
- However, there is a lack of empirical evidence to guide recruitment decisions in Web-only surveys
 - Especially for surveys of establishments

Email vs. Paper Invitations / Reminders



- Findings from individual/household survey literature (see background paper) are inconsistent

- Sometimes email invitations are more effective than paper invitations, other times not

- Prenotification literature suggests that paper invitation followed by email reminder improves response rates over an email-only contact strategy
 - But empirical evidence is mixed

Limitations of Previous Studies



- Small sample sizes
- University populations
- Email and postal addresses are both known
- Contact information is valid and regularly updated

Issues with Establishment Populations



- Email addresses lacking for many establishments
- Even email addresses provided by establishments through previous survey participation may be outdated

Possible remedies for establishment surveys



- In the case of invalid email addresses, supplementary paper contacts can be used to administer invitations/reminders

- If email address is entirely lacking, paper contacts can be administered from the outset

- Alternatively, establishments can be sent a prenotification letter with request to provide email address to receive email invitation
 - But increases costs and unclear whether establishments are willing to comply with such a request
 - Even if not, may still increase likelihood of response to subsequent paper invitation

Further research gap: Nonresponse Bias

- Besides response rates and costs, also important to consider effects of contact mode on nonresponse bias
- Response rates only weakly correlated with nonresponse bias
 - Groves (2006)
- High response rates do not imply low NR bias, just as low response rates do not imply high NR bias
- Detailed auxiliary information lacking in most NR studies

Research Questions

- What is the effect of paper vs. email invitations on response rates to a Web-only survey of establishments?
- Which combination of paper and email invitation/reminder modes maximizes response?
 - How useful are supplementary paper contacts for handling undelivered email invitations?
- Are establishments willing to provide an email address to receive an email invitation? How does this strategy compare to a paper-only contact strategy?
- What is the impact of different contact mode strategies on nonresponse bias and costs?

Survey on Applicant Selection (SAS) for Job Vacancies



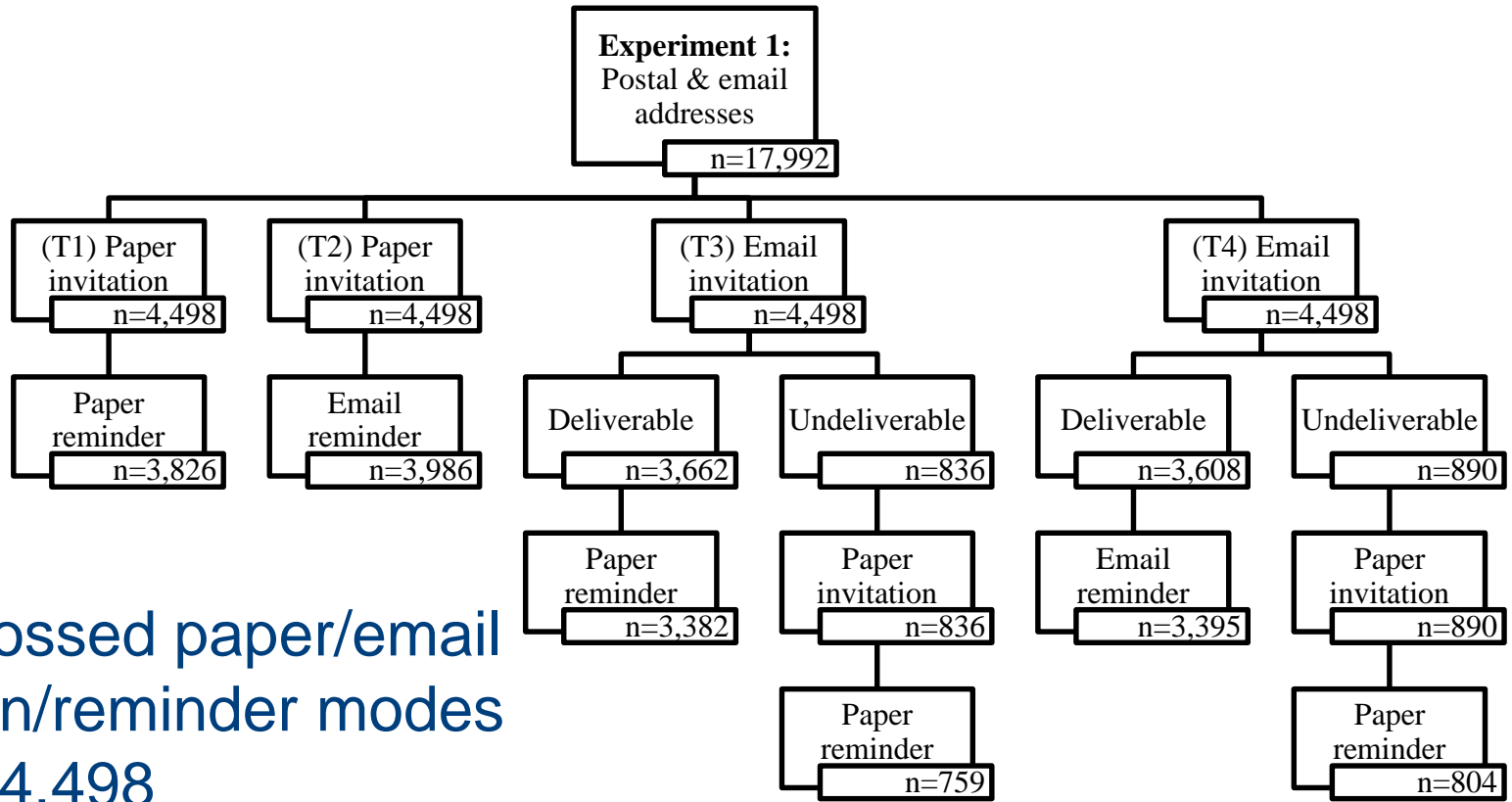
- “One-off” Web-only survey about factors that influence hiring decisions made when filling job vacancies
- Conducted by the IAB between Nov 2014 – Jan 2015
- N = 29,513 public and private establishments recruited
 - All previously participated at least once in the mixed-mode (mail/Web) IAB Job Vacancy Survey (JVS) from 2010-2012
 - All employed at least one individual in one of 25 target professions
- Establishments sampled from IAB register data
 - Register includes all establishments in Germany with at least one employee liable for social security contributions

Sample Details



- Postal and email addresses available for 17,992 establishments
- Email addresses voluntarily provided at the end of the JVS forerunner survey
- Most email addresses were personalized, including the name of the contact person (e.g. `firstname.surname@establishment.de`)
 - Drawback is that they expire as soon as contact leaves the establishment or changes name.
- No attempt was made to verify the validity of the email address prior to launching the SAS survey
- For the remaining 11,520 establishments, only postal addresses available
- Both groups differed with respect to employee composition; similar with respect to industry sector

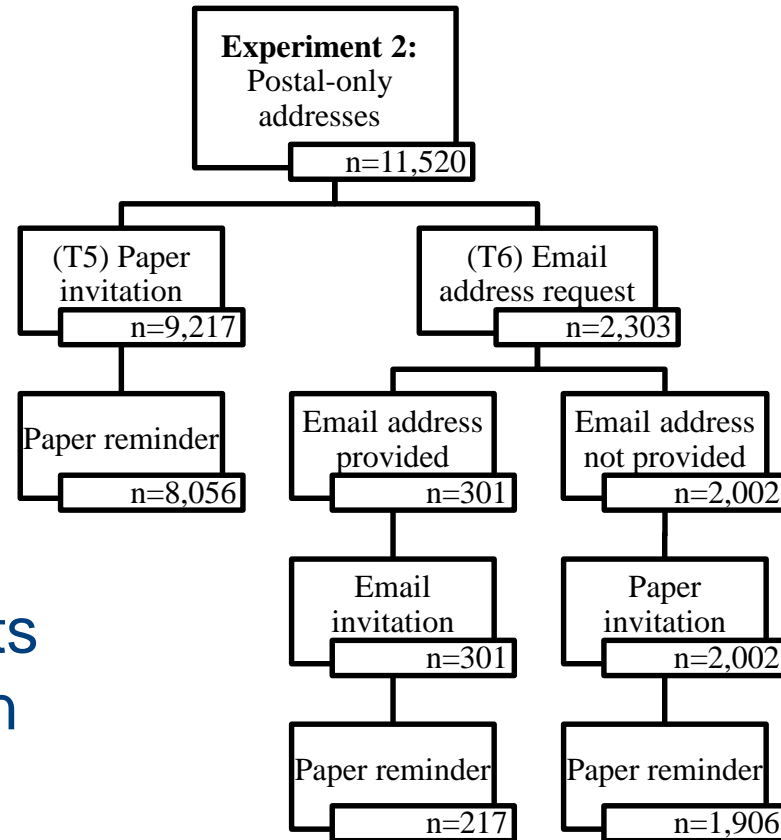
Experiment 1 (Postal-Email Addresses): Invitation and Reminder Mode (T1-T4)



- Fully crossed paper/email invitation/reminder modes
 - $N = 4,498$
- Supplementary paper contacts for undeliverable email invitations

Experiment 2 (Postal-Only Addresses): Prenotification and Email Address Request (T5-T6)

- Paper-only contact group
 - $N = 9,217$
- Prenotification letter sent with email address request
 - $N = 2,303$
- Supplementary paper contacts administered to prenotification nonrespondents ($N = 2,002$)



Additional Study Details



- All contacts addressed to the Human Resources (HR) office or managerial board of the establishments
- Included the salutation “Dear sir or madam”
 - Used even in the case of personalized email addresses
- All invitations/reminders included access link to the Web survey and personalized password
- Paper and email invitations/reminders delivered around same time

Analysis Steps: Comparison of Response Rates



- Response rates calculated:
 - 1) before reminder
 - 2) after reminder, and
 - 3) after supplementary paper contacts

- Response is defined as any establishment that initiated the Web survey, regardless if they actually completed the questionnaire
 - Includes break offs and those not reporting a target profession

- All establishments included in denominator, including undeliverable contacts
 - Similar to AAPOR Response Rate 1

Analysis Steps: Nonresponse Bias



- NR bias calculated using 12 establishment-level IAB register variables available for entire sample
 - Number of employees
 - % full-time employees
 - % female employees
 - % German employees
 - % low-qualified employees
 - % middle-qualified employees
 - % high-qualified employees
 - % marginal employees
 - Median age of employees
 - East (vs. West) Germany
 - Industry sector
 - Year of foundation
- All continuous variables categorized
- Preference given to equal-sized groups

■ Nonresponse bias

- Calculated as the difference between respondent-based estimate for category, c , of a given register variable:

$$\text{Nonresponse Bias}(\bar{Y}_c) = \bar{Y}_{c,r} - \bar{Y}_{c,n}$$

■ Average absolute nonresponse bias (AANB)

- Calculated as the average of the absolute value of all nonresponse bias estimates

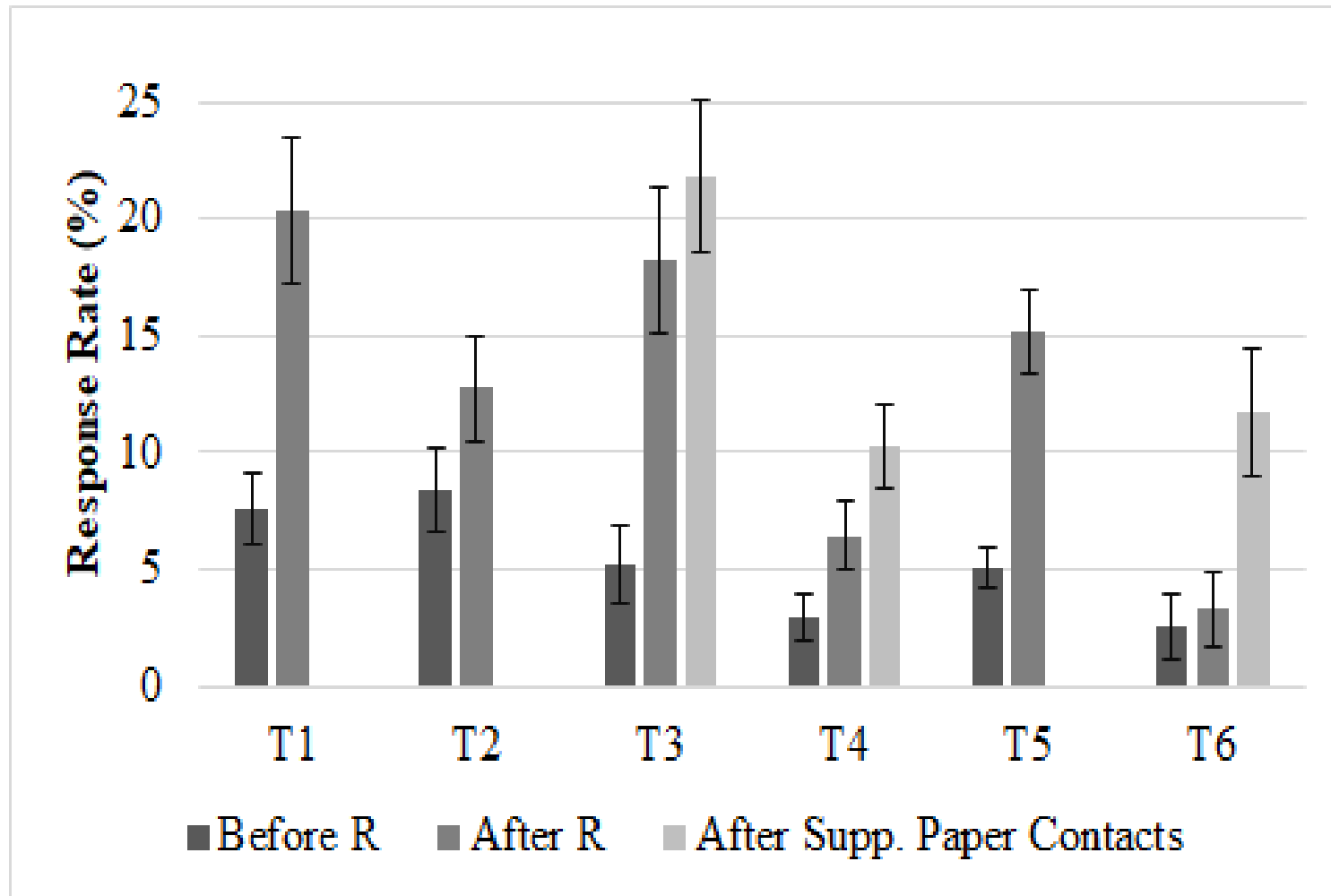
$$\text{Avg. Abs. Nonresponse Bias} = \frac{\sum_{c=1}^C |\text{NR Bias}(\bar{Y}_c)|}{C}$$

Analysis Steps: Costs



- Expense estimates provided by the postal department of the IAB
- Materials included printing, postage, and envelopes
- Personnel and working time expenses not included in the cost calculations
- Costs related to programming and testing Web survey instrument are assumed fixed across groups and not included in cost estimates
- Total costs and per-respondent costs are both reported

Results: Response Rates by Treatment Group



Experiment 1: Key Findings – Response Rates



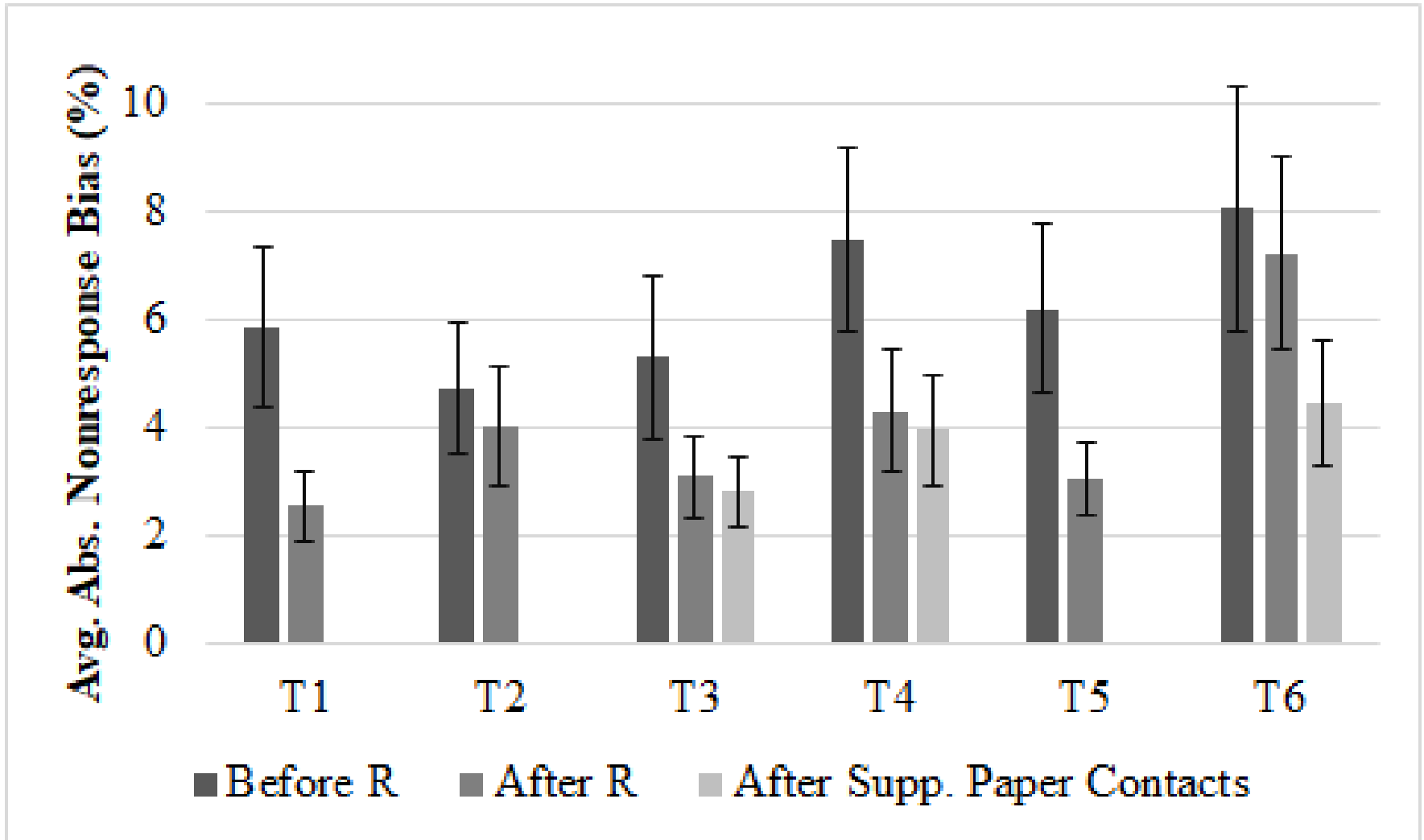
- Initial paper invitation (8.0%) more effective than email (4.1%)
 - Difference: $p < 0.000$
- Highest rates in paper-paper (20.3%) and email-paper (18.2%)
 - Difference: $p = 0.341$
- Lowest rates in paper-email (12.8%) and email-email (6.4%)
 - Difference: $p = 0.005$
- Supplementary paper contacts for undelivered email invitations (about 18% in both groups) produced a statistically significant improvement in response
 - Email-paper: from 18.2 to 21.9%
 - Email-email: from 6.4 to 10.3%

Experiment 2: Key Findings – Response Rates



- 8.4% of establishments provided an email address, of which 39.0% participated in Web survey after paper reminder
- Overall (unconditional) response rate is 3.3% in prenotification group
- Administering supplementary paper contacts to prenotification nonrespondents improved response rate to 11.7%, but still significantly lower than paper-paper group (15.2%)

Results: Average Absolute Nonresponse Bias (AANB)



Key Findings – NR Bias (AANB)



- Results largely consistent with response rate results
- That is, higher response rates yield smaller average NR bias
- Experiment 1
 - paper-paper < email-paper < paper-email < email-email
- Experiment 2
 - Paper-paper < prenotification email request group

- Reminder and supplementary paper contacts reduced AANB across all treatment groups

Results: Recruitment Costs



	Experiment 1: Postal-email addresses (N=17,992)				Experiment 2: Postal-only addresses (N=11,520)	
	T1	T2	T3	T4	T5	T6
Sample size	4,498	4,498	4,498	4,498	9,217	2,303
Total costs (in Euros)						
Before reminders	2,620	2,620	0	0	5,369	1,472
After reminders	4,849	2,620	1,970	0	10,062	1,598
After supp. paper contacts	--	--	2,899	987	--	3,874
Total costs per respondent						
Before reminders	5.20	5.12	0	0	6.83	17.72
After reminders	4.63	3.24	2.37	0	5.96	14.93
After supp. paper contacts	--	--	0.90	1.46	--	6.80

Key Findings – Costs

- Not surprisingly, lowest per-respondent costs associated with every email treatment group
- However, email-email not associated with lowest per-respondent costs after administering supplementary paper contacts
- Experiment 1 (after accounting for all contacts):
 - Email-paper < email-email < paper-email < paper-paper
 - Noteworthy that the cheapest and most expensive contact sequences also produced the highest response rates
- Experiment 2
 - Paper-paper < prenotification email request group

Overall Conclusions I



- Paper-only invitation/reminder strategy found to be most effective for maximizing participation among establishments
 - Finding holds regardless of email address availability
- Email-paper outperforms reverse sequence and performs similarly as well as paper-paper at a substantially lower per-respondent cost

Overall Conclusions II



- Supplementary paper contacts can be a useful means of obtaining responses from establishments with invalid/unknown email addresses
 - Also reduces aggregate NR bias and per-respondent costs

- However, survey organizations should not go out of their way to solicit email addresses from establishments for the sole purpose of administering an email invitation
 - Ineffective from cost and error perspective, relative to paper-only contact approach

Thank you for your attention!

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Target Professions



accountant, architect, bank teller, caregiver for disabled persons, chemist, computer scientist, construction engineer, cook, electrical engineer, emergency medical technician, general manager, hairdresser, HR specialist, industrial management assistant, industrial mechanic, IT specialist for application development, lawyer, mechanical engineer, office management assistant, pharmacists, physician, preschool teacher, secondary teacher, social worker, and truck driver