Classes of Nonrespondents in the ESS: Which Classes are Prioritized and Which Classes should be Prioritized in order to reduce nonresponse bias?

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Abstract: For many years now, survey methodologists have argued that response rates in social surveys are declining. Trends from ESS response rate data up to round 7 confirm that there is a slow decrease, despite the increased fieldwork efforts. Also, in some countries, there are indications of substantial bias due to nonresponse. Most (increased) fieldwork efforts target refusals and noncontacts. This paper examines whether this strategy is adequate in order to reduce nonresponse bias and whether a shift towards other classes of nonrespondents may optimize a bias reduction strategy. The results, based on round 7 of the ESS, suggest that refusal conversion hardly reduces bias and that an attention shift toward nonrespondents due to language barriers may be recommended.

Keywords: Nonresponse bias, classes of nonrespondents, European Social Survey.

1 Introduction

Lin and Schaeffer (1995) propose two different approaches by which increased fieldwork efforts can be augmented in order to improve survey response. First, the continuum of resistance model assumes a (strong) correlation between the effort during the fieldwork and the characteristics of the respondents. This means that late responders are more like the final nonrespondents (Smith, 1984). Under this assumption, the composition of the sample is expected to improve as more fieldwork efforts are made. Second, the classes of nonparticipants model rejects the starting point that there is only one single mechanism that explains survey participation (namely effort), and advances the idea that there are a variety of factors that contribute to the decision of whether to participate. This latter perspective is therefore obviously more skeptical about the usefulness of additional survey efforts in order to assess the effects of nonresponse. Therefore, the classes-of-participants model anticipates an improvement of the sample composition only if the relevant classes of nonrespondents are identified and additional efforts are made to pursue the equality of participation. Under this model, it can be assumed, for example, that nonresponse due to health issues may relate more to variables such as age, well-being or alcohol use, nonresponse due to a language barrier may affect variables related to migration or discrimination, noncontact may relate to type of housing, population density, etc.

Depending on the specific outcome of that first attempt (such as refusal, noncontact, illness, language barrier, ...) the expected success rate for further attempts may vary.

2 Method: How to optimally assign follow-up attempts to the different classes of nonrespondents in order to reduce nonresponse bias?

With the following set of model specification, we wish to simulate fieldwork extensions that add converted cases to the initial respondents, trying the keep the nonresponse bias below a certain threshold (α), while

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minimizing the number of contact attempts. As a result of this simulation, we quantify the extent to which the different classes of nonrespondents should be prioritized in follow-up fieldwork efforts in order to minimize nonresponse bias. The reason why some classes may be prioritized is that some classes have distinct characteristics that can improve the composition of the eventually obtained set of respondents after the follow-up efforts.

$$n_{final} = n_{initial} + \sum_{c=1}^{13} n_c(1 - (1 - \rho_c)^{k_c}) \tag{1}$$

$$bias_{final} = \frac{1}{A} \sum_{j=1}^{A} \left| \frac{\bar{a}_{final,j} - \bar{a}_{f,j}}{\sigma_{a_j}} \right| \tag{2}$$

$$min(E = \sum_{i=1}^{n} k_i) \tag{3}$$

$$bias_{final} < \alpha \tag{4}$$

Expression 1 defines how converted cases are added to the initially recruited set of respondents. For each class of nonrespondents c an amount of efforts k_c will be determined, with which a probability will be obtained $(1 - (1 - \rho_c)^{k_c})$ of converting a case from class c. The underlying statistical distribution is the geometric distribution. For example, if the success rate of class c is 0.22 ($= \rho_c$) and if for a case from that nonrespondent class 3 contact attempts are projected, the expected conversion success is $1-(1-0.22)^3 = 0.5254$. Multiplying this conversion success with the number of cases in class c gives the expected number of converted cases in that class.

The bias of the eventually obtained set of respondents can be determined by taking the average standardized bias that applies to the available auxiliary variables. $\bar{a}_{f,j}$ and σ_{a_j} represent the mean and standard deviation of the auxiliary variable a in the full sample (respondents and nonrespondents). $\bar{a}_{final,j}$ is the mean of the auxiliary variable a for the realized set of respondents after the additional fieldwork efforts are applied. An important assumption in this regard is that all cases of the same class have an equal probability to be converted, implying that the eventually converted cases of class c are representative of the entire class c. For example, if 20% of the cases of the class 'mild refusals' in Austria live in apartments, then this percentage also applies to the cases of this class that are eventually converted and will belong to the the set of final respondents.

Thus, the bias can be reduced by selecting the optimal number of cases per class of nonrespondents. This optimal number can be obtained by choosing the optimal number of additional contact attempts for all cases in the same class, taking the success rate ρ_c of that class into account.

This application will be illustrated by means of a simple fictitious situation, presented in Table 1. In a sample of n=2000, 1000 cases have been interviewed after the first contact attempt (see column 'n' in Table 1). There are three classes of nonrespondents: 400 cases are identified as refusals, there are 300 noncontacts and 300 'others'. In the full sample, 50% of the cases are men, although among the initially recruited cases, only 45% are men. As a consequence, a bias of 5 percentage points is observed or $\alpha = (0.50 - 0.45)/\sqrt{0.5 \times (1 - 0.5)} = 0.1$. Among the refusals, the distribution of men and women is very similar as compared to the initial respondents, so that converting refusals is probably not very likely to the improve the gender distribution in the finally obtained set of respondents (initial + converted). Among the noncontacts, and particularly the 'other' class of nonrespondents, many more men can be found. This makes these latter two classes more appropriate to try to convert additional cases from. It is also known that the different classes of nonrespondents have different response propensities. The probability of converting a refusal (ρ) at the next contact attempt is 30% is this example, whereas noncontacts have a higher conversion success (50%) and the 'other' class only 10%. These estimates can in practice be derived from former rounds of data collection. In the case of ESS7, these estimates will be obtained from ESS6.

The first optimization in Table 1 allows a final bias of $\alpha = 0.03$, while minimizing the number of follow-up contact attempts to stay below this level of bias. Therefore, the class of noncontacts is attributed 297.67[1] additional contact attempts, or 0.99 attempts per individual in this class (297.67/300). These efforts generate $300 \times (1 - (1 - 0.50)^{0.99}) = 149.19$ cases that can be added to the pool of recruited respondents (initial +

[1]Strictly speaking, fractions of contact attempts (or even fractions of individuals) are not realistic. Rounding to the nearest integer might therefore be more appropriate.

Table 1: Illustration of optimization in order to minimize nonresponse bias, fictitious data

Situation after first contact attempt ($\alpha = 0.10$):

	n	%man	ρ
initial	1000	0.45	
refusals	400	0.46	0.30
noncontacts	300	0.52	0.50
other	300	0.70	0.10
full sample	2000	0.50	
α		0.10	

Follow-up optimized towards $\alpha = 0.03$:

	k_c	k_i	# converted cases	updated n	%man
Initial + converted				1287.67	0.485
refusals	0.00	0.00	0.00	400.00	0.46
noncontacts	297.67	0.99	149.19	150.81	0.52
other	1762.89	5.88	138.48	161.52	0.70
full sample				2000	0.50
α					0.03

converted). Similarly, the 1762.89 attempts to be divided over 300 'other' pending nonrespondents generates 138.48 completed cases. In total, 1289.67 cases are completed, 400 are unattended refusals, 150.81 remain in the noncontacts class, 161.52 in the 'other' class of nonrespondents. Now, it is assumed that among the newly recruited cases from the initial class of noncontacts, the gender distribution is the same as in the total class of noncontacts, or $0.52 * 149.19 = 77.58$ men will be recovered and 71.61 women from the initial noncontact class will be added to the respondent set. This will drive the proportion of men in the obtained respondent set toward the proportion of the full sample, particularly because the newly recruited member from the 'other' class of nonrespondents contains substantially more men than women. Finally, the proportion of men among initially and converted respondents is 0.485 (the standardized equivalent or $\alpha = 0.03$). In order to achieve this, a minimum of $297.67 + 17.62.89 = 2060.65$ were needed.

The analysis will be a numerical optimization algorithm[2] that minimizes the total number of additional contact attempts E, as indicated by the expression 3. The crucial constraint of the algorithm is that it is forced to keep the average standardized bias below a pre-specified threshold α. Multiple optimizations will be run, where α={0.010, 0.015, 0.020, 0.025, 0.030, 0.035}[3].

3 Results

This optimization strategy will now be expanded to more ESS7 countries and more levels of tolerated bias (α=0.010, 0.015, 0.020, 0.025, 0.030, 0.035), where a maximum of 8 auxiliary variables have been used to measure the nonresponse bias. These are age, gender, presence of an entry phone, locked gate, type of residence, litter and vandalism in the neighboorhood and the quality of the house as assessed by the interviewer. Since not all countries have (complete) data on all eight auxiliary variables, a selection has been made: countries are included in the analysis only if the auxiliary variable is at least 90% complete.

Which classes of nonrespondents should be prioritized is in displayed Figure 1. Red dots represent the observed fieldwork prioritization. As can be seen in Figure 1, most countries prioritize 'not available', 'broken appointment', 'disabled (short)', noncontacts, 'other', 'moved (known)', partial interviews and (mild and moderate) refusals. 'Language barriers', 'disabled (long)' and invalids are usually not prioritized. However, as suggested by the optimization algorithms, the actual prioritization of cases is not advisable if the ESS

[2]Obtained through the solnp-function of the Rsolnp package in R

[3]For each α and each country separately, the optimization algorithm is run 10 times, using randomly chosen starting points. This is needed since the algorithm has a risk of ending up in local rather than a global optimum. The most optimal result is used

would prefer to reduce nonresponse bias. Generally, all types of initial refusals, 'not available', 'broken appointments' and partial interviews are not recommended by the optimization results to be prioritized for further fieldwork efforts. Conversely, the classes that are not frequently revisited in the actual fieldwork tend be more interesting for bias reduction purposes. These classes include invalids, 'moved (known)', but specifically 'language barriers'.

There is a general trend suggesting to prioritize small nonrespondent classes such as 'language barriers' or 'moved (known)' instead of groups that are usually prioritized such as 'not available' or refusals. These latter classes are usually targeted to increase the response rate. Nevertheless, in some specific countries, specific optimization results are observed. For example, 'disabled (short)' is a nonrespondent class for which in different countries the prioritization is suggested: Switzerland (CH), Denmark (DK), Hungary (HU), the Netherlands (NL) or Portugal (PT). In some countries re-approaching noncontacts is not advised by the optimization results: Czech Republic (CZ), Germany (DE), Estonia (EE), Israel (IL), Norway (NO) and Portugal (PT), although it is required by the ESS specification to do so. Although refusal conversion is suggested in order to enhance response, it hardly contributes to the reduction of nonresponse bias. Only in Hungary (HU) and Portugal (PT) refusal conversion among hard and moderate refusals is advised. In a few more countries, the conversion of mild refusals is also encouraged the the optimization algorithms.

4 Discussion

Although noncontacts and refusals are usually perceived as the main classes of nonrespondents, this analysis made clear the minority classes of nonrespondents may have a strong impact on nonresponse bias too. In particular, language barriers may be a prominent class of nonrespondents to focus on in the future, even though it is a relatively small class.

Obviously additional fieldwork efforts towards these minority cases not only require more contact attempts (more attempts will obviously not make the target person the speak the language of the questionnaire), but predominantly challenge the survey agency and interviewers to invest in the translation of the questionnaire, sending optimally skilled interviewers to the target sample cases and invest in the command of multiple languages. Therefore, a single-minded focus on the traditional efforts in survey fieldwork may fall short if one wants to reduce nonresponse bias. New techniques in questionnaire design and interviewer management may be preferred in order to successfully target such minority classes of nonrespondents, when the aim is to reduce the bias due to nonresponse.

After all, the ESS is essentially a *social* survey. From this perspective, it should not exclude or discriminate groups that appear to be hard to reach or recruit, such as immigrants, or for example the growing segment of elderly people in modern European societies. If this policy of non-discrimination is endorsed, the fieldwork, questionnaire and interviewing routines have to be adapted accordingly.

Should bias reduction be a main goal in the ESS? Currently, a 70% response rate and 97% contact rate are required by the ESS specifications, objectives that are only met rather occasionally. Moreover, survey literature suggests that high response rates are no guarantee for a reduction of bias (see, for example, the work of Groves (2006)). The analysis in this paper suggest to even reduce the overall level of fieldwork efforts (very likely to lead to even lower response rates) but to more meticulously target the fieldwork efforts toward specific groups of nonrespondents.

References

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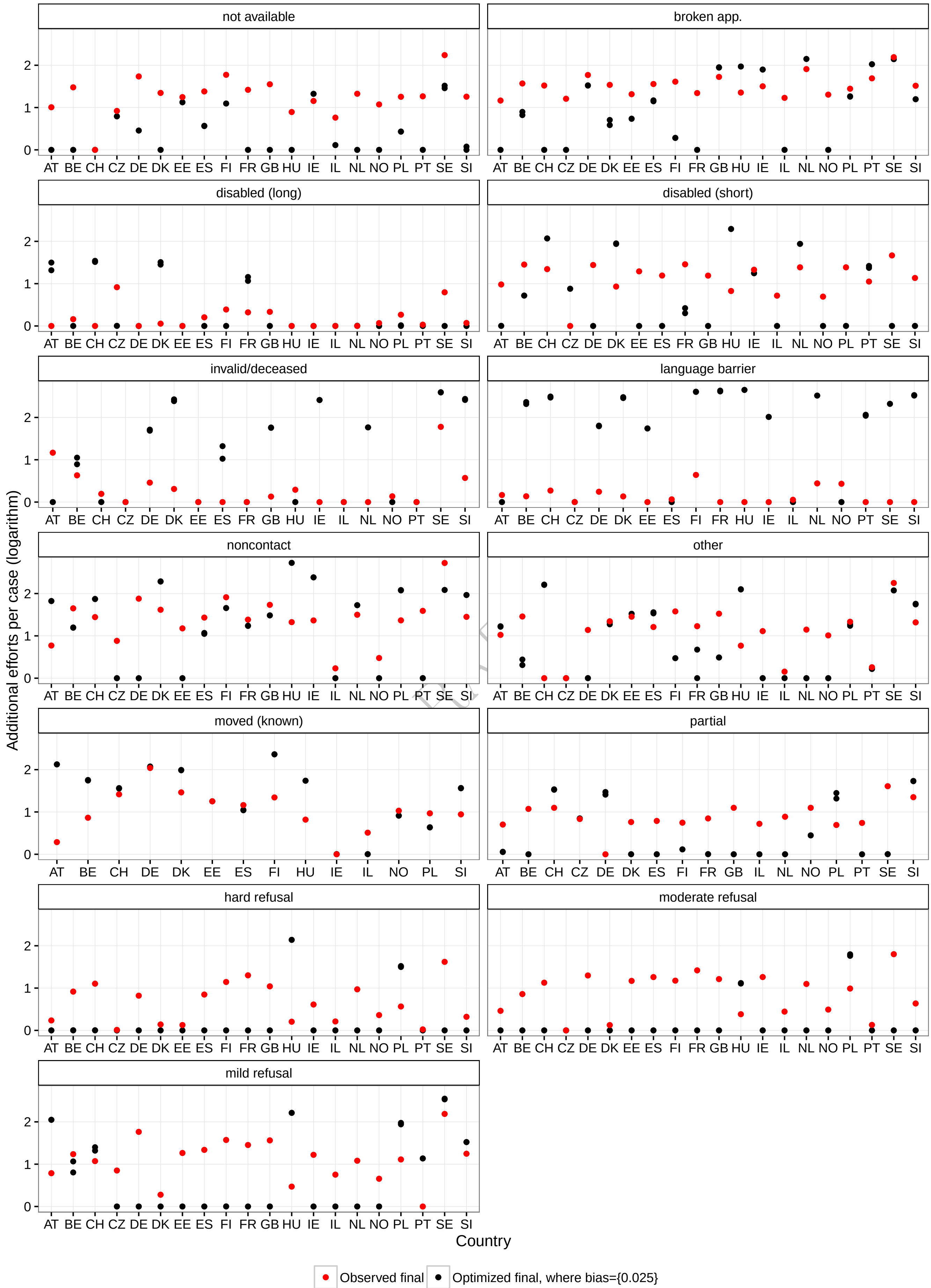

Figure 1: Observed and optimized ($\alpha = 0.02$) fieldwork efforts, ESS7