

Respondent Behavior in Panel Studies - A Case Study for Income-Nonresponse by means of the German Socio-Economic Panel (GSOEP)¹

Jörg-Peter Schräpler

(Joint Program of Survey Methodology, Maryland; Ruhr-University Bochum and
DIW Berlin)

joerg-peter.schraepler@ruhr-uni-bochum.de

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ABSTRACT

Many validation studies deal with item-nonresponse and measurement error in earnings data. In this paper we explore motives of respondents for the failure to reveal earnings using the German Socio-Economic Panel (GSOEP). GSOEP collects socio-economic information of private households in the Federal Republic of Germany. We explain the evolution of income-nonresponse in the GSOEP and demonstrate the importance of a discrimination between refusing the income-statement or don't know.

Keywords: Respondent behavior; Interviewer effects; Item-Nonresponse; Panel analysis

JEL classification: C81

1. Introduction

Since the survey interview is a major source of research data in the social sciences, it is not surprising that there is a large literature on the quality of survey data focused specifically on respondents and interviewer effects. In the last decade panel studies have become more popular, hence studies in this subject area dealing with longitudinal data have become increasingly important.² Many of them are especially focused on unit-nonresponse (cf. Pickery/Loosveldt/Carton (2001), Campanelli/O'Muircheartaigh 1999; O'Muircheartaigh/Campanelli 1999).

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²For example Zouwen/Van Tilburg (2001) or the longitudinal study of marriage by Veroff/Hatchett/Douvan (1992) and the study by Wilson et al. (1989).

This paper focuses on item-nonresponse and unit-nonresponse in the German Socio-Economic Panel (GSOEP). We describe the history and try to explain on the basis of a cognitive and rational choice theory why respondents refuse to state their income question. The GSOEP is a longitudinal representative survey containing socio-economic information³ on private households in the Federal Republic of Germany (Wagner/Burkhauser/Behringer 1993; Dunn/Frick/Witte 1998). It is similar to the US Panel Study of Income Dynamics (PSID). DIW Berlin (German Institute for Economic Research) is managing the GSOEP study. The first wave of data, collected in 1984 from the old Federal Republic of Germany contains 5,921 households. The original sample was supplemented with a sample of East German residents (in 1990) and one of immigrants (in 1994/95). All household members aged 16 and older are surveyed.

2. Explaining respondent effects in surveys

The large body of literature on respondent and interviewer effects shows that both respondent and interviewers can be recognized as a potential source of error in surveys. Several various respondent and interviewer characteristics have been thought to have an impact on data quality. The interview situation is recognized as a social process in which the respondent acts to achieve personal goals. The respondent's view of the situation decides whether his answer is factual or serves another goal. Many alternative respondent behaviors occur during interviews (cf. Kahn/Cannel 1957, p. 129ff.). The following are particularly important to individual interviews:

1. The respondent refuses to participate (unit-nonresponse).
2. The respondent agrees to participate but refuses to answer some questions, for example about his income (item-nonresponse).
3. The respondent agrees to participate but withholds facts and answers in a way that systematically pursues personal goals or interests (social desirability, acquiescence).
4. The respondent tends to select a certain response category disproportionately regardless of fact (response styles)
5. The respondent agrees to participate and endeavors to answer all questions in accordance with the facts.

To understand the respondent's choice of one of these behaviors, it is essential to know the motives of the respondent. Rational Choice theory (RC) (cf., Esser 1993)

³GSOEP provides also a wealth of methodological information about the survey methods utilized and the characteristics of the interviewers (cf., Schräpler/Wagner 2001).

and cognitive theory (Tourangeau 1984; Tourangeau et al. 2000) provide useful theoretical frameworks to explain respondent behavior. In cognitive theory, several stages of cognitive processing are distinguished: interpreting the question to understand its meaning, retrieving relevant information, integrating that information into judgement, and formatting and editing a response. Editing is based on considerations of social desirability and self-presentation (Sudman/Bradburn/Schwarz 1996, Tourangeau 1984). This theoretical approach gives insight into the answering process. Nevertheless for the last stage of editing we need to understand the concepts of sensitivity and social desirability. Those concepts relate respondents behavior to interaction between the respondent and the interviewer. RC-theory and his variant the utility theory provides a useful framework for analyzing sensitivity. The application of utility theory to survey responding has been explored by several researchers (cf. Sirken et al. 1991, Esser 1993). Recent studies use the psychological laboratory to indicate the usefulness of the utility model for studying the response to sensitive questions (Willis et al. 1994; Willis et al. 1998).

The application of RC theory to respondent behavior states that respondents to a survey "choose" their answers, and that the choice depends on which of the possible replies appears to be the best choice. The choice thus depends on what the respondents presume to be the consequences of certain behavior or answers judging from visible or assumed features of their situations; on how the respondents assess the situation with regard to these assumed consequences (cf. probability of adverse outcomes); and on how they evaluate these consequences in the face of their own preferences (Esser 1993, p. 293-294). Thus the individual selects a specific action after assessing the situation and evaluating the consequences of possible actions. In rational choice theory individuals chose those alternatives which realize certain goals. It is generally assumed that actors attempt to attain social acceptance or avoid disapproval (cf., Phillips 1971, 1973).

3. Item-Nonresponse - a cooperation problem

We learned much about earnings and their determinants from data collected in income and labor market surveys such as the German Socio-Economic Panel (GSOEP), the Current Population Survey (CPS) and the Panel Study on Income Dynamics (PSID). Unfortunately the quality of data in these surveys is undermined by the failure of some participants to report their wages and salaries. Missing data create three major problems: 1. Nonrespondents are typically different from the respondent; naive analysis that ignores these differences will be biased; 2. missing data implies a loss of information. 3. Many standard statistical techniques require rectangular data sets; in the absence of imputation analyzes are restricted to the set of complete observations (cf., David et al. 1986, Little/Schenker 1995). Item-nonresponse is often treated by imputing the missing items. There are various techniques, many which are designed

especially for income adjustments, that can be used (cf., David et al. 1986, Brownstone/Valetta 1996).

Several reasons for item-nonresponse are mentioned in the literature. Loosveldt et al. (1999) assume that item-nonresponse occurs when the answering process fails to proceed smoothly because the respondent lacks motivation or ability. Item-nonresponse also depends on the evaluation by the respondents of the questions asked: the questions are too difficult, not interesting, too embarrassing or too threatening (Loosveldt/Pickery/Billet 1999).

Income questions belong to the category of sensitive questions. Their content pertains to personal and intimate information. In a study on attitudes toward money conducted on a non-representative, Washington DC area convenience sample, van Melis-Wright and Stone (1993) found that the two most frequently endorsed statements were "I think it is impolite to ask others about their financial situation," and "Surveys asking about my finances should be completely anonymous."

Sensitive questions encompass several aspects. Tourangeau et al. (2000) distinguish three of them: 1. invasion of privacy, 2. risk of disclosure of answers to third parties and 3. social (un)desirability of the answers. The first relates mainly to the sensitive topic of the questions and not necessary to the answers of such questions. Tourangeau et al. (2000, p. 258) argue that monthly income is clearly not the thing one could ask a neighbor or a casual acquaintance over lunch. Hence, it is not surprising that under certain conditions the respondent may regard the declaration of his income or other intrusive questions as unpleasant and refuse these statements. This behavior relates to the degree of the invaded privacy and reflects aversion to answer intimate questions. Concerns about privacy refer to a desire to keep information about oneself out of the hands of others altogether. We can suspect, that this aversion depends primarily on the question and the general topic of the survey. But the circumstances in which the question are asked and the personality of the respondent might also affect the refusal to answer (Tourangeau et al. 2000).

The second aspect refer to concerns about confidentiality. Singer/Mathiowetz/Couper (1993) demonstrate a relationship between concerns about confidentiality and privacy that affect significantly mail returns to the 1990 U.S. census. Concern about confidentiality refer to the desire to keep data already given to one agent out of the hands of others (Singer et al. 1993). People may be unwilling to discuss income because their true income differs from their declarations on income tax forms, loan/credit/scholarship applications, government benefit statements or other income-based records (cf. Smith 1991). Perhaps in some cases there is a risk of data abuse and a disclosure of answers to third parties.

But often social costs are concerned, which arise from admitting to a deviation from a public norm, or from a norm generated by the interview situation. Income is a major

component in defining one's social class and standing. As a result, people with low incomes may be afraid that this will reflect badly on them (Smith 1991). A working hypothesis is that persons with low income disproportionality refuse to respond. A large deviation between one's own income and the internalized social norm for income, the respondent withholds his response because of social desirability (cf. Wagner/Motel 1996).

Loosveldt et al. (1999) assume that item-nonresponse to sensitive or threatening questions that are strongly related to the substantive topic of the questionnaire will predict unit-nonresponse in the following wave. Item non-respondents remember the interview as a negative or unpleasant experience and are more likely to refuse in the following wave than others. Furthermore Burton/Laurie/Moon (1999) express the idea that one can place all potential respondents to a survey on a cooperation continuum (figure 1). At one end are those who will always take part and will answer any question, on the other end are those respondents who are hard to persuade and will tend to refuse often. Using data of the British Household Panel Study (BHPS), their findings indicate an interaction between unit-nonresponse and item-nonresponse. People who are more reluctant to take part in surveys will also be more reluctant to answer individual questions, and vice versa.

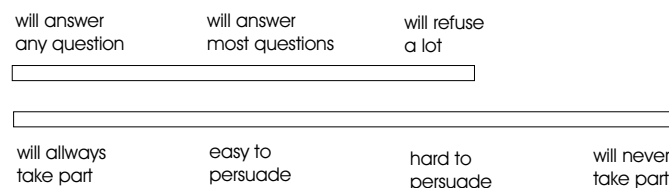


FIG. 1.— *Cooperation continuum (Burton et al. 1999)*

Table 1 interprets the origins of the cooperation continuum of underlying cognitive problems and motivations. The table separates two distinct origins for non-response.

Cognitive Limitations: At the first level income nonresponse as well as unit-nonresponse is not a result of unwilling or refusing but the impossibility to participate or difficulty of reporting the labor income. There are several distinct stages in the cognitive work necessary to answer an income question, like understanding, retrieval, and response production. Response errors can occur at any stage (cf. Moore/Stinson/Welniak 2000). Some respondents cannot recall their gross-income. This is clearly a case of "don't know" response category. Our hypothesis is that respondents who don't answer a particular question because of cognitive limitations (e.g. don't know) differ from respondents who are not willing to cooperate and refuse their statement.

In addition some problems cause people who would normally take part not to participate, e.g. sickness, work, scheduler, change of address or death.

TABLE 1: *Reasons for item- and unit-nonresponse*

	1. limitations	2. respondent's assessing and evaluation	less of cooperation
Item-nonresponse	<ul style="list-style-type: none"> cognitive limitations ⇒ "don't know" (understanding, retrieval, response production) doesn't apply 	<ul style="list-style-type: none"> loss due to disclosure to third parties (cf. data abuse) ⇒ refuse question mainly in the first contact loss due to social (un)desirability ⇒ refuse question that may reflect badly on him loss due to invade of privacy ⇒ refuse to answer sensitive questions 	
Unit-nonresponse	<ul style="list-style-type: none"> not possible (moved, sick, dead) 	<ul style="list-style-type: none"> survey is too sensitive ⇒ refuse participation out of interest ⇒ refuse participation not confidential ⇒ refuse participation 	

Source: own arrangement

The second level deals with respondent's assessing and evaluation of the interview situation and his own choice to cooperate. We take into account respondent's fear of disclosure to third parties, the influence of social desirability and the general aversion to report intimate facts. Independent measurements of these concepts are not available in the data, but we can use these theoretical concepts to predict respondent's behavior.

Disclosure to third parties and confidence building: In RC-theory we can interpret concerns about confidentiality as fear about loss to disclosure to third parties. Individuals appear to vary in the strength of their worries about confidentiality and this degree of concern could have some effect on their willingness to cooperate (Singer/Mathiowetz/Couper, 1993). The degree of concern may also be determined by the characteristics of the interviewer and by the relationship between respondent and interviewer (cf. Sudman/Bradburn 1974, Pickery et al. 2001). As GSOEP is a panel study, the respondent meets the interviewer several times. When they first meet, the tendency to refuse may be stronger than on later occasions, because successful contacts build confidence⁴. Subsequent contacts increase trust, encouraging answers to sensitive questions like the income statement, and decrease the fear of negative consequences, including data abuse. We can expect that refusing an answer concerning to the fear of disclosure to third parties is primarily a problem in the first contact. Therefore our second hypothesis is that the refusal rate is highest in the first wave and decrease in subsequent waves.

⁴The change of the interviewer is an exceptional case in the GSOEP. Rendtel (1995) has shown that a change of the interviewer is a strong indicator for unit-nonresponse.

Social desirability: Social desirability includes two aspects. First the respondent may be concerned to have the interviewer's approval. Approval depends on the presence of an interviewer, the topic of the question and the facts about the respondent's conduct or attitudes. Second personality traits may cause: Respondents distort their answers because of underlying needs, such as the need for social approval or the need to conform to social standards (cf. Tourangeau et al. 2000, p. 257-258). Fear of disapproval of low earnings by the more accomplished interviewer may create an incentive for low-earning respondents with need of social approval to refuse earnings (cf. Smith 1991; Wagner/Motel 1996). These respondents refuse only answers that will reflect badly on them, in all other cases they will cooperate. Our third hypothesis is that low-earning respondents have a higher refusal rate than high-earning respondents due to the influence of social desirability.

Invasion of Privacy: Some nonrespondents may have a general aversion to answer intimate questions and think income questions are an invasion of privacy. These respondents are identified by less cooperation and have often several refusals in their questionnaire. Privacy concern goes to the heart of a respondent's willingness to participate in a survey (Singer et al. 1993). We can assume that numbers of this group are not whole-hearted survey co-operators, and clearly have misgivings about the whole process. They drift to the end of the cooperation continuum and are harder to persuade in the following wave (Burton et al. 1999; Bollinger/David 2001). Our fourth hypothesis is that respondents who refuse their income statement are more likely to drop out of the survey than others. We expect a negative correlation between refusing the income question and survey participation in the following wave.

Respondents near the uncooperative extreme of the cooperation continuum are those respondents who will never take part in surveys of any kind as a matter of principle, either because of concerns about intrusiveness, confidentiality or because they do not want to waste their time (Burton et al. 1999). Meta-analysis of studies on response rates to mail surveys shows, that the topic of a survey has a clear impact on people's willingness to take part in it (Yammarino/Skinner/Childers, 1991; Heberlein/Baumgartner 1978). Both respondent interest in the topic and the topic's sensitivity seem to be important for the willingness to participate. The benefit of responding is apparent if the survey serves a meaningful purpose for the respondent. Often it is useful to emphasize the scientific or a public sponsor of the survey. Surveys conducted under the aegis of the Federal government typically achieve much higher levels of cooperation than non-government surveys (cf. Goyder 1987).

The mode of the interview may also contribute to the difficulty respondents and interviewers experience when talking about income. Groves (1989) and Jordan et al. (1980) find more missing values for income in telephone surveys than in face-to-face interviews. Moore et al. (2000) argue that the telephone may simply lower some of

the social barriers against expressing the discomfort about discussing income overtly. Following this idea we suspect the greater the social barriers the higher the justification costs for refusals. These costs may vary with the interview situation. In mail or self-completed questionnaires or in telephone interviews it is much easier for the respondent to refuse an answer than in face-to-face interviews where the interviewer asks the respondent directly. Nevertheless the mode of the interview is partially determined by the respondent and an endogenous variable in the GSOEP. Hence we can't prove this hypothesis about justification costs and mode. But we expect, that uncooperative respondents will choose modes like self-completion or mail.

4. Item- and unit-nonresponse in the GSOEP

As a first step we take a look at the history of the item-nonresponse rate for the gross-income question among employed persons in the GSOEP in Sample A (West-Germans)⁵. The rates are a result of blank, do not know and refused entries. Special

TABLE 2: *Item-Nonresponse-rate for the gross-income question from employed persons in the GSOEP, Sample A (in per cent)*

	including self-employed and trainees			excluding self-employed, trainees and proxies		
	employed respondents	missing*	%	selected respondents	missing*	%
wave 1	5017	640	12.8	4135	437	10.5
wave 2	4709	622	13.2	3845	394	10.2
wave 3	4520	526	11.6	3654	314	8.6
wave 4	4525	499	11.0	3677	294	8.0
wave 5	4309	469	10.9	3512	275	7.8
wave 6	4213	427	10.1	3478	252	7.3
wave 7	4128	446	10.8	3420	281	8.2
wave 8	4160	494	11.9	3462	327	9.4
wave 9	4013	433	10.8	3379	286	8.5
wave 10	3952	371	9.4	3339	227	6.8
wave 11	3796	306	8.1	3225	198	6.1
wave 12	3780	304	8.0	3222	204	6.3
total	51122	5537	10.8	42348	3489	8.2

Source: GSOEP 1984 - 1995 Sample A, employed respondents (own calculation)

*result of blank, "do not know" or "refused" entries

problems occur in the case of the income question for self-employed respondents. The

⁵The annual question for all employed respondents asks:

"How high were your earnings last month?

If you received any additional payments last month, e.g. holiday money or back-pay please do not include these. Also allowance for children do not include. However, do include money earned for overtime."

income question is not designed to elicit estimates of business profits for the monthly reference period. Due to these problems self-employed respondents, trainees and proxies are excluded from our empirical analysis. Table 2 shows a decrease in item-nonresponse from about 10 percent in the first two waves to approximately 6 percent after 12 years. The gross-earnings item-nonresponse rate is quite low in comparison to other international and national surveys (Madow et al. 1983, p. 24).

In the previous section we argued that item-nonresponse and unit-nonresponse can be understood as different locations on a cooperation continuum. Table 3 shows the loss of information due to item- and unit-nonresponse for gross-income. The unit-nonresponse rate is calculated as the percentage of selected employed respondents in wave t , who don't participate in wave $t + 1$. As the starting point of this process we use wave 1. The overall loss of information in each wave is a result of the number of item-nonresponse and lost participants.

TABLE 3: *Loss of information due to item- and unit-nonresponse for gross-income from employed persons in the GSOEP, Sample A (in per cent)*

wave t	selected employed respondents** in wave t	Item-Nonresponse		Unit-Nonresponse		Total		
		missing* income in wave t	%	lost employed participants of wave $t - 1$	%	selected + lost participants	overall missings	%
wave 1	4135	437	10.5	-	-	4135	437	10.5
wave 2	3845	394	10.2	415	10.0	4260	809	19.0
wave 3	3654	314	8.6	341	8.9	3995	655	16.3
wave 4	3677	294	8.0	231	6.3	3908	525	13.1
wave 5	3512	275	7.8	285	7.8	3797	560	14.7
wave 6	3478	252	7.3	247	7.0	3725	499	13.4
wave 7	3420	281	8.2	242	7.0	3662	523	14.3
wave 8	3462	327	9.4	172	5.0	3634	499	13.7
wave 9	3379	286	8.5	171	4.9	3550	457	12.9
wave 10	3339	227	6.8	162	4.8	3501	389	11.1
wave 11	3225	198	6.1	183	5.5	3408	381	11.2
wave 12	3222	204	6.3	134	4.2	3356	338	10.1
total	42348	3489	8.2	2583	6.6	44931	6072	13.5

Source: GSOEP 1984 - 1995 Sample A, employed respondents, without self-employed, trainees and proxies (own calculation)

*result of blank, "do not know" or "refused" entries

**old and new employed respondents

Unit-Nonresponse is indicated if respondents are not able (sick, dead, moved abroad a.o.) or unwilling (refusing) to participate on the survey. A small part of households could not be found during the field work. Table 4 shows the frequencies of this categories for respondents who were employed in their last wave, from wave 2 to 12. 80 percent of the attrition is caused by unwilling respondents and refusals. Note that we don't use in our unit-nonresponse analysis the first wave because we apply only on respondents who participate at least one wave.

TABLE 4: *Reasons for unit-nonresponse in Sample A, employed in the last wave (in per cent)*

	wave 2-12	
	N	%
unsuccessful at the time (sick, a.o.)	199	7.7
unwilling	832	32.2
final refusal	1222	47.3
moved abroad	57	2.2
dead	62	2.4
HH not found	145	5.6
isol. temporary sample member	66	2.6
Total Unit-Nonresponse	2583	100.00

Source: GSOEP 1985 - 1995 Sample A, employed respondents (own calcul.)

The focus in our paper is on income-nonresponse, but in a broader sense of respondent behavior related to missing values it might be useful to describe the whole distribution of missings. Table 5 shows the distribution and some overall descriptive statistics for each wave. On average the number of missing values in the questionnaire is relative low and in wave 1 higher than in other waves. Nevertheless the number of questions in the questionnaire varied each year. It might be more reasonable to use a statistical measure like the 75th percentile.

TABLE 5: *Distribution of the number of missing values (item-nonresponse) in the GSOEP*

number of missings	waves											
	1	2	3	4	5	6	7	8	9	10	11	12
0	128	1526	1261	1587	1403	1318	857	1143	1520	1279	1600	124
1	346	1010	969	922	926	807	1152	946	925	800	868	1082
2 - 5	2634	1034	1165	940	1002	1101	1105	1078	740	959	595	1564
6 - 10	887	208	209	170	124	163	82	221	135	222	107	297
11 - 15	110	36	35	34	39	50	84	44	33	47	27	89
16 - 20	20	10	11	10	12	21	108	20	14	20	14	38
over 20	10	21	4	14	6	18	32	10	12	12	14	28
N	4135	3845	3654	3677	3512	3478	3420	3462	3379	3339	3225	3222
mean	4.28	1.74	1.81	1.60	1.56	1.91	2.53	1.94	1.46	1.93	1.31	3.26
sd	2.94	3.26	2.49	2.82	2.47	3.16	4.37	2.94	2.79	3.13	2.92	4.41
median	4	1	1	1	1	1	1	1	1	1	1	2
75th percentile	5	2	3	2	2	2	2	2	2	2	1	4
min	0	0	0	0	0	0	0	0	0	0	0	0
max	40	52	29	43	32	38	52	41	44	44	62	53

Source: GSOEP 1984 - 1995 Sample A, individual questionnaire, employed respondents (own calculation)

In the next section the distribution of income-nonresponse is examined in detail. Schupp/Wagner (1996) show that item-nonresponse for gross income depends on the mode of data collection method for GSOEP. The GSOEP represents a “method-mix”. The survey is carried out mainly by face-to-face interviews (face). Respondents also may complete the questionnaire by themselves and receive help from the interviewer

on demand (self). A few cases participate by mail if respondents would otherwise fail to cooperate. Figure 2 shows that face-to-face interviews have the lowest income-nonresponse, and mail questionnaires the highest. A similar pattern can be observed for respondents with unit-nonresponse in the following wave in figure 3. The mode "mail" can be interpreted as a strong indicator for poor cooperation.

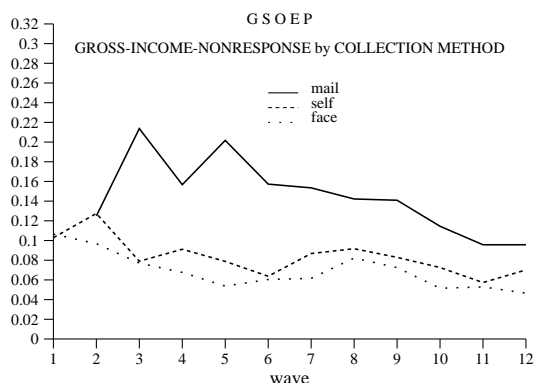


FIG. 2.— *Share of income-nonresponse by data collection methods from 1984 - 1994, Sample A, employed persons.*

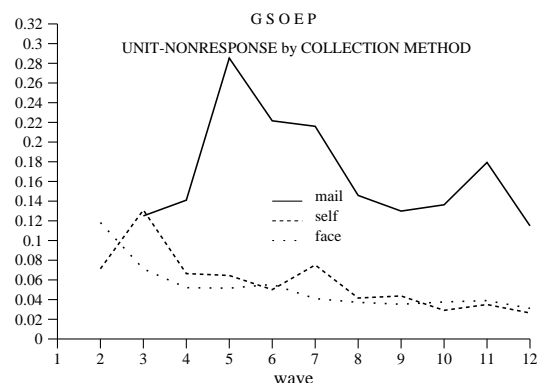


FIG. 3.— *Share of unit-nonresponse by data collection methods in the last wave from 1985 - 1995, Sample A, employed persons.*

To show the influence of income on income-nonresponse we classify occupation into three groups (table 6). The groups are defined on type of position (wage, salary, or civil service) and occupational skills. Figure 4 shows the trend in the share of income-

TABLE 6: *Classification of the vocational position*

	vocational position	occupation
LOW	worker	unskilled worker, semiskilled worker
MEDIUM	worker	skilled worker, foreman, master,
	salaried employee	industry- and works foreman, employee with simple activity, qualified activity
	official	minor and lower-grade civil service
HIGH	salaried employee	high qualified activity, executive function
	official	high and senior service

nonresponse for each occupational group. In the first wave reveals hardly any difference among the three categories. The following waves show a divergence between the low vocational position and the other groups. Item-nonresponse rate remains at a high level for unskilled and semi-skilled workers, while the rate for the respondents with better

income falls off rapidly⁶.

At first view this pattern seems to support our second and third hypothesis about trust building and (un)social desirability. Unfortunately this figure is ambiguous, since refusals are not distinguished from 'don't know' or 'blank' for gross-income in the GSOEP. We have to use another measurement. An additional item about respondent's net-income follows the gross-income question. It is reasonable to assume that respondents who state their net-income but not gross-income simply do not know their gross-income. Table 7 shows 46% of all missing values for gross-income fall in this category. We assume that employed respondents with missing values for both items intend to refuse their statements (54%).

TABLE 7: *Missing gross- and net-income in percent*($n = 42,348$)

gross- income	net-income		total
	valid	missing	
valid	90.68	1.08	91.76
missing	3.81	4.43	8.24
total	94.49	5.51	100.00

Source: GSOEP 1984 - 1995

Figure 5 shows the trend for both behaviors. While the share of "refusals" declines slightly, the share of "don't knows" seems to be relatively stable over all waves. Figure 6 and 7 display the distributions by the occupational states. Apparently we find in figure 7 the opposite result of figure 4. The high earners have in this case the highest refusal rates, followed by the medium and low earners. The trend declines for all occupational states. The share for the "don't know" category is shown in figure 6. We can recognize a stable high proportion of low earners who don't know their gross-income but respond valid net-incomes. This descriptive findings reject our third hypothesis, the low-earners don't refuse their income statement due to social (un)desirability but rather due to cognitive limitations. It might be that their monthly gross-income vary and it is easier for them to recall the net-income.

As already mentioned above the choice between face-to-face interview and self completed questionnaires is based on the interaction between respondent and interviewer. Non-cooperative respondents may choose an interview method like self completion which relieve refusing sensitive or threatening answers. Figures 9 and 8 confirm this assumption. Refusals are higher in self completed versions and "don't knows" in face-to-face interviews. Respondent behavior may vary according to more distinguishing characteristics of the interview situation. Figures 10 and 11 show the share

⁶Some previous studies find that those with income missing have lower income (cf., Smith 1991; Kalton/Kasprzyk/Santos 1981).

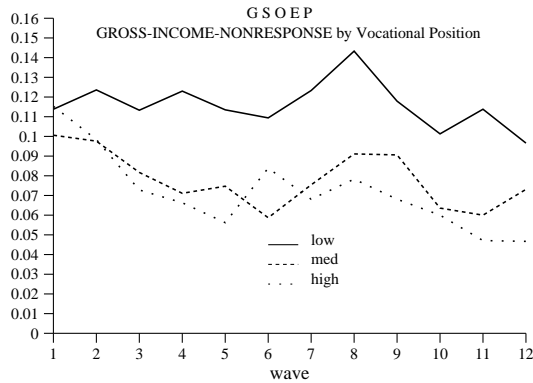


FIG. 4.— *Share of gross-income-nonresponse by occup. status, 1984 - 1994, Sample A, empl. respondents.*

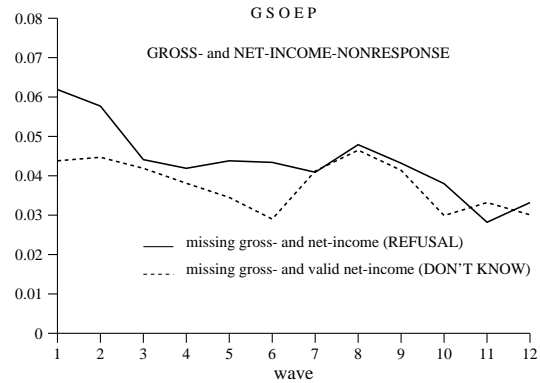


FIG. 5.— *Share of gross- and net-income-nonresponse, 1984 - 1995. Sample A, employed respondents.*

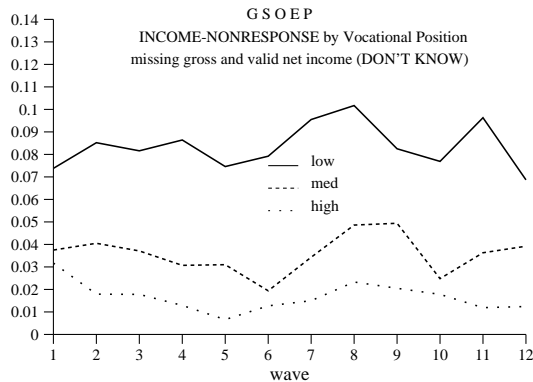


FIG. 6.— *Share of missing gross- and valid net-income respond by occup. status, 1984 - 1994, Sample A, empl. respondents.*

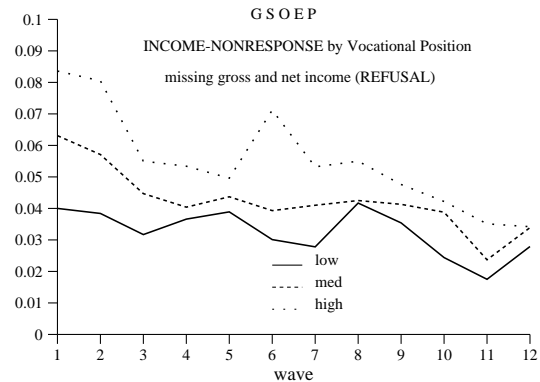


FIG. 7.— *Share of missing gross- and net-income by occupational status, 1984 - 1994, Sample A, employed respondents.*

of income-nonresponse by the age of the interviewer and the respondent. We can observe that younger interviewers get a little bit more "refusals" as well as "don't know" answers and older respondents refuse more in the first wave.

Figures 12 - 15 examine the impact of interviewer's and respondent's gender. We recognize that female respondents have higher frequencies in the "don't know" category but we find no gender effect due to refusals. Female interviewers get more "don't knows" than male interviewers and also more refusals in the early waves. It may be that it is easier for respondents to refuse statements to female interviewers.

The last four figures 16 - 19 refer to unit-nonresponse. Figure 16 shows that respondents with many missing values (> 75 th percentile) are more likely to drop out of the survey than others. This is in line with our fourth hypothesis and the perception

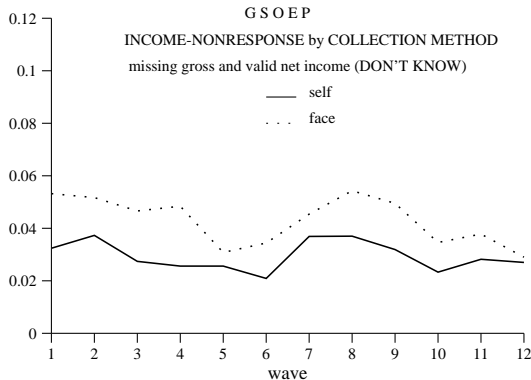


FIG. 8.— *Share of missing gross- and valid net-income by collection method, 1984 - 1995, Sample A, empl. respondents without mail interv.*

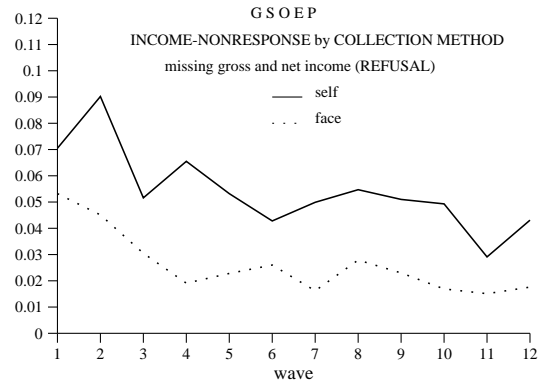


FIG. 9.— *Share of missing gross- and net-income by collection method, 1984 - 1995, Sample A, empl. respondents without mail interv.*

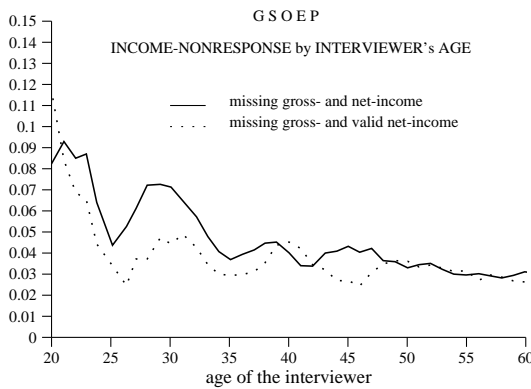


FIG. 10.— *Share of income-nonresponse by interviewer's age, 1984 - 1995, Sample A, employed respondents (local estimated).*

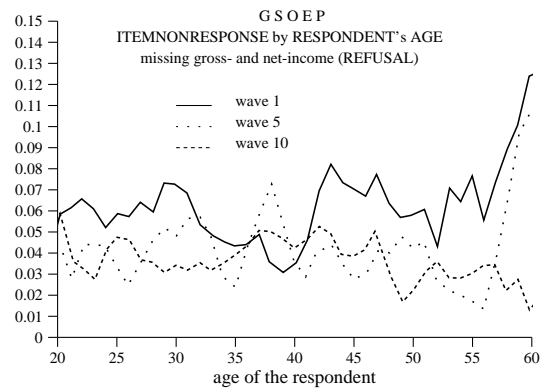


FIG. 11.— *Share of missing gross- and net-income by age of the respondent, Sample A, employed respondents (local estimated).*

of a cooperation continuum. This finding is not very surprising but it leads to another important point: longitudinal analysis due to item-nonresponse might be affected by selection processes. It suggests to control for an attrition bias in statistical models.

The other figures 17 and 18 point up that unit-nonresponse depends neither on interviewer's gender nor on the vocational position of the respondent. But we can recognize that the change of the interviewer increase the probability for unit-nonresponse (figure 19). One explanation for this is that respondents learn to trust an interviewer and those with high level of distrust react to a strange interviewer by refusing to be interviewed (cf. Bollinger/David 2001; Rendtel 1990).

To control for respondent and interviewer variables we estimate multilevel regres-

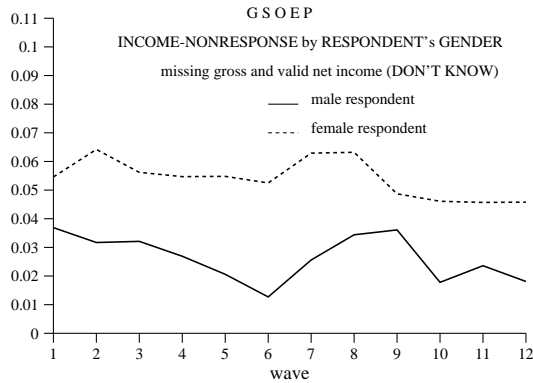


FIG. 12.— *Share of missing gross- and valid net-income by respondent's gender, 1984 - 1994, Sample A, employed respondents.*

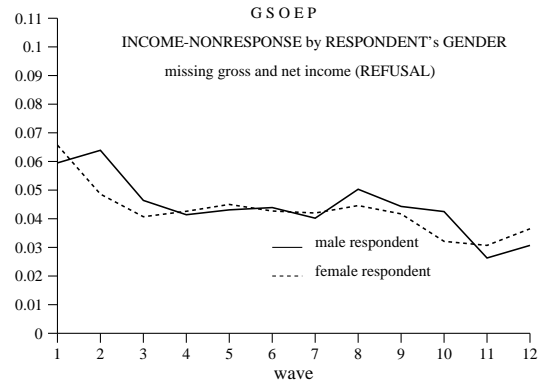


FIG. 13.— *Share of missing gross- and net-income by respondent's gender, 1984 - 1994, Sample A, employed respondents.*

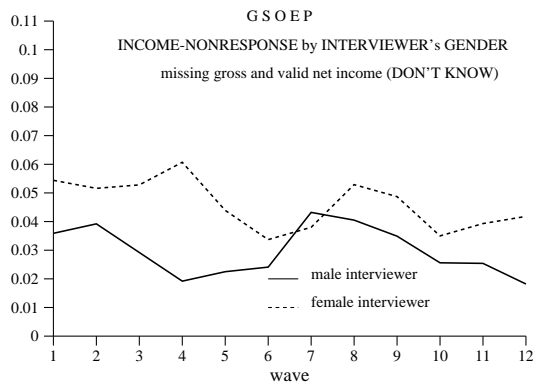


FIG. 14.— *Share of missing gross- and valid net-income by interviewer's gender, 1984 - 1994, Sample A, employed respondents.*

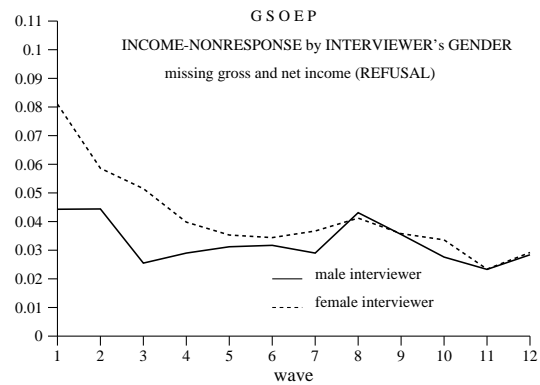


FIG. 15.— *Share of missing gross- and net-income by interviewer's gender, 1984 - 1994, Sample A, employed respondents.*

sion models.

4.1. Modeling income-nonresponse

In section 3 we refer to RC-Theory and view respondents as decision makers who face choices between three alternatives: to report their income, to acknowledge lack of information by don't know, or to refuse as a conscious choice based on strongly held motives. The conventional model of choice in economics and other social sciences ascribes an unobservable level of utility \tilde{U}_{jm} to alternative m for decision maker (respondent) j . Our primary purpose is to determine how various factors influence the attractive-

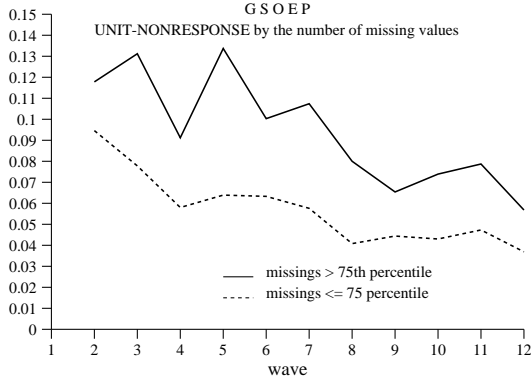


FIG. 16.— *Share of unit-nonresponse by number of missing values, 1984 - 1995, Sample A, resp. who were empl. in the last wave and drop out.*

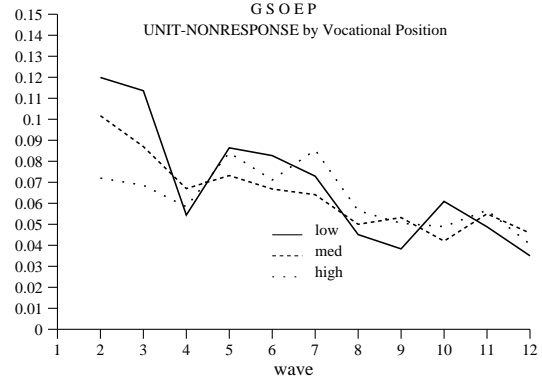


FIG. 17.— *Share of unit-nonresponse by vocational position, 1984 - 1995. Sample A, respondents who were employed in the last wave and drop out.*

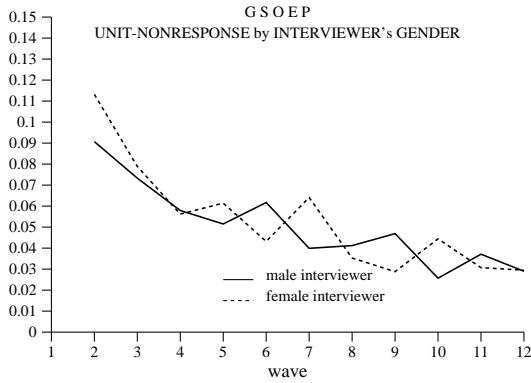


FIG. 18.— *Share of unit-nonresponse by interviewer's gender, 1984 - 1994, Sample A, respondents who were empl. in the last wave and drop out.*

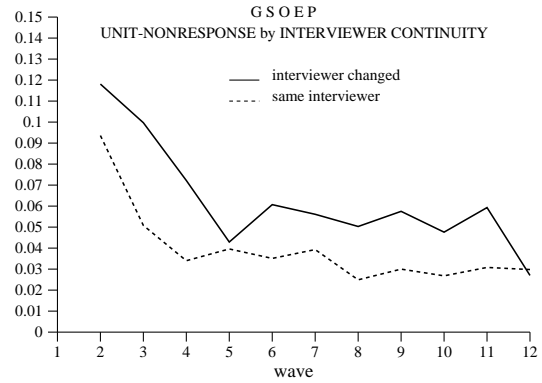


FIG. 19.— *Share of unit-nonresponse by interviewer's continuity, 1984 - 1994, Sample A, respondents who were empl. in the last wave and drop out.*

ness of the alternatives to different types of individuals, hence we use a regression-like framework (cf. Dubin/Rivers 1989, p.373):

$$\tilde{U}_{jm} = \beta_1' \tilde{x}_{jm} + \epsilon_{jm} \quad (m = 1, 2)$$

where \tilde{x}_{jm} includes the costs of alternative m and other relevant factors. In RC-Theory the decision maker maximizes his utility. The difference between the utility of two alternatives is:

$$y_j^* = \tilde{U}_{j1} - \tilde{U}_{j2} = \beta' x_j + u_j \quad (1)$$

where $x_j = \tilde{x}_{j1} - \tilde{x}_{j2}$ and $u_j = \epsilon_{j1} - \epsilon_{j2}$. If $y_j^* > 0$, the first alternative (item-nonresponse) yields higher utility and is selected, otherwise the second one. We observe only a dummy variable, y_j :

$$y_j = \begin{cases} 1, & \text{if } y_j^* > 0, \text{ e.g. item-nonresponse} \\ 0, & \text{otherwise} \end{cases} \quad (2)$$

If we assume that ϵ_{j1} and ϵ_{j2} have a joint normal distribution, each with mean zero, we get a probit model.

Studies of respondent and interviewer effects generally combine both respondent and interviewer variables. Typically, interviewer variables are disaggregated to the level of the dependent variable, i.e., the respondent level, and both interviewer and respondent variables are combined in one regression model. Because the respondents are not usually assigned randomly to interviewers, and because each interviewer questions several respondents, the usual assumption that observations are independent is violated. Any unmeasured interviewer variation results in apparent correlation of error terms across respondents. Lack of independence leads to underestimated standard errors of the regression parameters and inefficient estimates (cf. Hox 1994, p. 303).

The survey data have a hierarchical structure: the respondents are nested within interviewers, where the respondent level is said to be the lower and the interviewer level the higher level⁷. The appropriate method of analysis is the use of hierarchical or multilevel models that estimate of both the interviewer variance and the effects of explanatory variables measured at the interviewer and the respondent level (cf. Hox 1994; Pannekoek 1991; Hill 1991). A variety of names for this statistical model are used, including: mixed models (Longford 1987), multilevel models (Goldstein 1995), random coefficient models (Longford 1995) and hierarchical models (Bryk/Raudenbush 1992). These models generally involve linear regression models that allow the possibility of considering some parameters other than the residuals to be random rather than fixed.

We estimate separately for wave 1, 2 and 3 two probit models, a simple univariate probit model with response variable "income-nonresponse" and a multivariate probit model with three response variables "refuse", "don't know" and "unit-response in the next wave" (participation).

The hierarchical structure for this applications is caused by a multiple nesting of the longitudinal data.

Level 1 represents the different response variables in the multivariate model. We

⁷Of course, we can use other concepts with further levels like an additional household level. Due to our interest in this study and estimation problems that occur in cases of further levels, we restrict on two levels.

define $i = 1$ (refuse), $i = 2$ (don't know) and $i = 3$ (unit-response). Level 2 consists of j respondents and level 3 represents the aggregate level, which is formed by k interviewers.

For person j and interviewer k three dichotomous variables y_{ijk} are observed.

$$y_{1jk} = \begin{cases} 1, & \text{if } y_{1jk}^* > 0, \text{ refuse} \\ 0, & \text{otherwise} \end{cases} \quad (3)$$

$$y_{2jk} = \begin{cases} 1, & \text{if } y_{2jk}^* > 0, \text{ don't know} \\ 0, & \text{otherwise} \end{cases} \quad (4)$$

$$y_{3jk} = \begin{cases} 1, & \text{if } y_{3jk}^* > 0, \text{ unit-response (next wave)} \\ 0, & \text{otherwise} \end{cases} \quad (5)$$

We use a multivariate probit model with three levels:

$$y_{ijk} = \sum_{i=1}^I \pi_{ijk} + \sum_{i=1}^I u_{ijk}. \quad (6)$$

When the intercept β_{0ik} is only allowed to vary on the interviewer at each response variable $i = 1, 2, 3$ and the other coefficients (β_{ih}) are specified as fixed parameters, the probability π_{ijk} for each response variable i is:

$$\pi_{ijk} = \Phi \left(\beta_{0ik} + \sum_{h=1}^H \beta_{h,i} x_{h,ijk} + v_{0,ik} \right) \quad (7)$$

y_{ijk} is an indicator for a specific respondent behavior j (e.g. refuse) in context of interviewer k . $x_{h,ijk}$ represent values for covariates x_h ($h = 1, \dots, H$) of person j and interviewer k . The intercept β_{0ik} is specified as random on level 3 (interviewer level) and the variance is estimated as $v_{0,ik}$ (matrix Σ_I). The random variation among the respondents on level 2 is estimated as the variance/covariance u_{ijk} (matrix Σ_R). Since these are dependent binomial variables⁸, the residual variances $\sigma_{u_i}^2$ and covariances $\sigma_{u_{ii'}}$ must be estimated. For the variance/covariance matrices on respondent (matrix Σ_R) and interviewer level (matrix Σ_I) we assume that

$$\begin{bmatrix} u_1 \\ u_2 \\ u_3 \end{bmatrix} \sim (0, \Sigma_R) : \Sigma_R = \begin{bmatrix} \sigma_{u_1}^2 & & \\ \sigma_{u_2 u_1} & \sigma_{u_2}^2 & \\ \sigma_{u_3 u_1} & \sigma_{u_3 u_2} & \sigma_{u_3}^2 \end{bmatrix}$$

⁸Often binomial distributed residuals on level 1 are assumed. Nevertheless they may be extra-binomial and can be estimated with the program MLwiN (Rasbash et al. 1999).

$$\begin{bmatrix} v_1 \\ v_2 \\ v_3 \end{bmatrix} \sim N(0, \Sigma_I) : \Sigma_I = \begin{bmatrix} \sigma_{v_1}^2 & & \\ \sigma_{v_2 v_1} & \sigma_{v_2}^2 & \\ \sigma_{v_3 v_1} & \sigma_{v_3 v_2} & \sigma_{v_3}^2 \end{bmatrix}$$

4.1.1. Regressors of the cooperator model

Regressors can be considered in three groups:

1. *Demographic and household variables for the respondent:* AGE is the age of the respondent in years, AGE2 is age squared, SEX indicates male respondents, LOW and HIGH indicates the occupational position, UNSTEADY indicates if respondent is unsteady working and CHILDREN indicates children in respondent's household. REMOVAL is a dummy for moved respondent.

2. *Demographic variables for the interviewer:* IAGE is the age of the interviewer, IAGE2 is age squared, ISEX indicates male interviewer.

3. *Variables that describe the interview situation:* ICHANGE indicates a change in interviewer, CARE measure the number of successful interviews among respondent and the same interviewer and FIRST indicates the first interview.

4.1.2. Estimates

Tables 8, 9 and 10 shows the estimates⁹ of the univariate (model 1) and the multivariate probit models (model 2) for wave 1 - 3.

The sample contains approximately 4000 respondents from 543 interviewers¹⁰ in wave 1 . The equation in model 1 refer to gross- income-nonresponse and is used for comparison only. In model 2 the two probits for "refuse" and "don't know" partition the sample. We can recognize that the estimates in model 1 form the essentially the weighted sum of the two probit equations in model 2. The third equation in model 2 refers to unit-response in the following wave.

⁹The analysis is done with MIWIN 1.2 (Rasbash et al. 1999). We used the iterative generalized least squares (IGLS) algorithm with extra binomial option and the 2nd order penalized quaslikelihood (PQL) procedure (Goldstein/Rasbash 1996).

¹⁰In the following waves the number of interviewers (and clusters) declines because Infratest Burke (München), the company who carries out the GSOEP set priorities on sophisticated interviewer.

Estimates of the parameters for respondent variables are important for our first hypothesis. We hypothesize different characteristics for "refusal" and "don't know" respondents. The estimates in all three waves confirm the results of the description above: respondents who refuse their income- statement are primarily high earners and respondents who don't know their gross-income are mainly working individuals with irregular employment or low-earners. We find significant effects for irregular working respondents for both nonresponse variables only in wave 2 and the estimates demonstrate that the impact is much stronger for "don't know" rather than "refusal". Furthermore we endorse the gender effect in the description: respondents who don't know their gross income are mainly female. Presence of children in households increases don't know nonresponse in wave 2. Overall these findings support our first hypothesis: namely the respondent characteristics for refusals and don't know differ markedly. Our perception is, that it is important to interpret missing values correctly if we try to reduce item-nonresponse rates.

Our second hypothesis predicts higher refusal rates in the first contact because of building trust in subsequent waves. Variable (CARE) measures the number of successful contacts between respondent and the same interviewer in wave 3. We can assume that several contacts with the same interviewer will change the interview situation. The estimates show that continued interviewing by the same interviewer decrease in wave 3 refusals for gross- income. A strong effect relates to interviewer gender (ISEX). Female interviewers get in all three waves noticeably more don't knows and refusals than male. This suggests that both refusing and don't know depends on the interview situation created by the interviewer.

Our third hypothesis is that respondents with low income have higher refusal rates than high- earning respondents due to social desirability. This does not appear to be the case. The estimates in wave 1 - 3 show that a high percentage of missing values of low-income respondents results from don't know responses. In contrast we find a higher probability for refusals in the case of high- and medium- earners. These estimates reveal increasing refusals with increasing respondent income.

Our fourth hypothesis refers to a cooperation continuum and states a negative correlation between refusing the income statement and survey participation in the following wave. The random part of model 2a - 2c consists of two covariance matrices Σ_R and Σ_I . Σ_R describes the random variation among respondents and is estimated as the variance/covariance u_{ijk} . The estimates in the tables 8 - 10 show small but highly significant negative covariances between the error terms of "Refuse" and "Unit-response in the following wave": model 2a: $\sigma_{u_1 u_3} = -0.038$ (correlation $r_{u_1 u_3} = -0.071$); model 2b: $\sigma_{u_1 u_3} = -0.027$ (correlation $r_{u_1 u_3} = 0.050$) and model 2c: $\sigma_{u_1 u_3} = -0.028$ (cor-

relation $r_{u_1 u_3} = 0.060$)¹¹. The covariances among the error terms of "Don't know" and "Unit-response" are in all waves not significant. Although the values of $r_{u_1 u_3}$ are not high, it supports the idea of a cooperation continuum: employed respondents who refuse their income statement tend slightly to drop out of the survey in the following wave.

Model 2 gives some information about respondents survey participation (β_{3jk}): male respondents, younger respondents, respondents who move and unskilled and semi-skilled worker (LOW) are more likely to stamp out.

Next we examine the random variation of the intercept β_{0jk} on level 3 (interviewer level). The interviewer variability is significant in all equations. We can calculate its share of the entire error variance, often called intraclass correlation or interviewer effect, with

$$\rho_{int} = \frac{\sigma_{v_i}^2}{\sigma_{u_i}^2 + \sigma_{v_i}^2}$$

and get the following values

wave	Intraclass correlation		
	refusal	don't know	Unit-response
1	0.627	0.773	0.401
2	0.562	0.870	0.318
3	0.575	0.810	0.478

This indicates a significant interviewer influence and/or a significant area effect to all three response behaviors, but especially for don't know. We can't distinguish from interviewer and area cluster because the interviewers are not assigned randomly to the sample points.

5. Conclusion

The present study deals with item-nonresponse in the case of gross-income in the German Socio-economic Panel (GSOEP). We investigate why respondents don't reveal their income. The study uses information from persons in 6000 households, information about interviewers, and the mode of data collection. GSOEP permits investigating the behavior of respondents over a decade.

¹¹The correlation result from

$$r_{i,i'} = \frac{\sigma_{u_{ii'}}}{\sqrt{\sigma_{u_i}^2} \times \sqrt{\sigma_{u_{i'}}^2}}$$

TABLE 8: *Multivariate Multilevel Probit-model for income-nonresponse, wave 1*

	Model 1a		Refuse	Model 2a		Unit-Response ($t + 1$)			
	Item-Nonresponse			Don't Know					
	$\hat{\beta}$	s.e.	$\hat{\beta}_1$	s.e.	$\hat{\beta}_2$	s.e.	$\hat{\beta}_3$	s.e.	
intercept	-0.484	(0.834)	-0.520	(0.825)	-1.568	(1.147)	1.240*	(0.635)	
<i>respondent</i>									
sex (1 - men)	-0.065	(0.064)	-0.016	(0.058)	-0.069	(0.064)	-0.118**	(0.054)	
age (year)	-0.064***	(0.016)	-0.069***	(0.015)	-0.044***	(0.015)	0.020	(0.014)	
age2	0.001***	(0.000)	0.001***	(0.000)	0.001***	(0.000)	-0.001	(0.001)	
medium position (ref.)									
low position	-0.034	(0.079)	-0.434***	(0.084)	0.380***	(0.072)	-0.114*	(0.062)	
high position	0.169***	(0.083)	0.187**	(0.071)	0.081	(0.092)	0.215**	(0.077)	
children in hh	-0.007	(0.068)	-0.015	(0.062)	-0.082	(0.070)	0.078	(0.056)	
unsteady working	0.604***	(0.115)	0.174	(0.122)	0.916***	(0.104)			
removal							-0.517***	(0.085)	
ichange							-0.111	(0.070)	
<i>interviewer</i>									
isex (1 - men)	-0.352***	(0.111)	-0.294**	(0.112)	-0.328**	(0.160)	0.128	(0.084)	
iage (year)	-0.004	(0.033)	-0.001	(0.034)	0.010	(0.047)	-0.007	(0.025)	
iage2	0.1×10^{-4}	(0.000)	0.1×10^{-4}	(0.000)	0.1×10^{-4}	(0.000)	0.1×10^{-4}	(0.000)	
<i>respondent level</i>									
u_1	0.746***	(0.018)	u_1	0.445***	(0.011)	u_2	u_3		
u_2				-0.019**	(0.007)	0.351***	(0.008)		
u_3				-0.038***	(0.009)	-0.002	(0.008)	0.640***	(0.015)
<i>interviewer level</i>									
v_1	0.705***	(0.087)	v_1	0.748***	(0.090)	v_2	v_3		
v_2				0.067	(0.096)	1.199***	(0.160)		
v_3				-0.059	(0.051)	-0.013	(0.072)	0.429***	(0.053)
Interviewer cluster	543					543			
persons	3969					3969			
$2 \times \text{LogLikel.}$	-2629.88					-20950			

NOTE: Asymptotic standard errors in parentheses; Significance: *10%; ** 5%; *** 1%

Source: GSOEP 1984, Sample A, empl. respondents, without self-empl. and trainees, without mail interv. (own calc.)

A conceptual framework for the failure to reveal earnings analysis is drawn from rational choice theory. The statistical method uses multi-variate probit in a hierarchical specification.

The first relevant finding in this analysis is the necessity to distinguish refusals from don't knows. The description in section 4 and the estimates in the multivariate analysis in section 4.1 presents evidence for our first hypothesis, that the respondent characteristics for refusal and don't know responses differ markedly. Respondents who refuse their answer are mainly high earners in high occupational positions. Respondents who do not know their incomes are mainly females, low earners and respondents who work irregularly. This finding is important for the interpretation and reduction of item-nonresponse. Many studies try to predict item-nonresponse with respondent characteristics but fail to use response categories such as refuse and don't know. The resultant conclusions are ambiguous and hard to interpret, which may be the reason for the inconsistency in this area.

TABLE 9: *Multivariate Multilevel Probit-model for income-nonresponse, wave 2*

	Model 1b		Refuse	Model 2b		Unit-Response ($t + 1$)		
	Item-Nonresponse			Don't Know				
	$\hat{\beta}$	s.e.	$\hat{\beta}_1$	s.e.	$\hat{\beta}_2$	s.e.	$\hat{\beta}_3$	s.e.
intercept	1.187	(1.260)	-0.219	(0.999)	0.899	(1.980)	-0.668	(0.771)
<i>respondent</i>								
sex (1 - men)	-0.095	(0.068)	0.144**	(0.064)	-0.403***	(0.066)	-0.012	(0.060)
age (year)	-0.052***	(0.018)	-0.029*	(0.017)	-0.060***	(0.017)	0.073***	(0.016)
age squared	0.001***	(0.000)	0.001***	(0.000)	0.001***	(0.000)	-0.001***	(0.001)
medium position (ref.)								
low position	0.181**	(0.085)	-0.245**	(0.092)	0.640***	(0.076)	-0.154**	(0.072)
high position	0.116	(0.093)	0.183**	(0.077)	-0.224**	(0.114)	0.163*	(0.087)
children in hh	0.012	(0.075)	-0.127**	(0.066)	0.238**	(0.081)	-0.015	(0.063)
unsteady working	1.117***	(0.138)	0.609***	(0.145)	1.183***	(0.121)		
removal							-0.184	(0.106)
change of interviewer							-0.088	(0.101)
<i>interviewer</i>								
isex (1 - men)	-0.426***	(0.155)	-0.308***	(0.118)	-0.419***	(0.251)	0.070	(0.091)
iage (year)	-0.082	(0.052)	-0.049	(0.040)	-0.093	(0.084)	0.035	(0.030)
iage2	0.1×10^{-4}	(0.000)	0.1×10^{-4}	(0.000)	0.1×10^{-4}	(0.000)	0.1×10^{-4}	(0.000)
<i>situation</i>								
first interview	-0.006	(0.210)	0.050	(0.193)	0.076	(0.192)		
<i>respondent level</i>								
u_1	u_1		u_1		u_2		u_3	
u_1	0.695***	(0.017)	0.445***	(0.011)				
u_2			-0.026***	(0.007)	0.306***	(0.008)		
u_3			-0.027***	(0.009)	0.009	(0.008)	0.662***	(0.016)
<i>interviewer level</i>								
v_1	v_1		v_1		v_2		v_3	
v_1	1.010***	(0.138)	0.573***	(0.083)				
v_2			0.344**	(0.129)	2.055***	(0.308)		
v_3			-0.029	(0.048)	-0.042	(0.099)	0.308	(0.050)
Interviewer cluster	381				381			
persons	3568				3568			
$2 * \text{LogLikel.}$	-4225.26				-23854.2			

NOTE: Asymptotic standard errors in parentheses; Significance: *10%; ** 5%; *** 1%

Source: GSOEP 1985, Sample A, empl. respondents, without self-empl. and trainees, without mail interv. (own calc.)

The second relevant finding is that survey respondents fall on a cooperation continuum (Bollinger/David 2001; Burton et al. 1999; Loosveldt 1999b). Respondents who refuse to answer the sensitive questions (e.g. income) because of privacy concerns are often not whole-hearted survey co-operators and have misgivings about the whole process. They drift to the end of the cooperation continuum and are harder to persuade in the following wave. The estimates of our multivariate probit models support this hypothesis, as we find a small negative but significant correlation between refusing the income question and survey participation in the following wave. As expected, the correlation in the case of don't know is not significant.

The third relevant finding is that interviewers have a strong effect on a respondent's propensity to give refusals and don't know responses. Female interviewers get noticeably more don't knows and refusals than males. One possible explanation is that it may be easier for an uncooperative respondent to refuse to answer a female than

TABLE 10: *Multivariate Multilevel Probit-model for income-nonresponse, wave 3*

	Model 1c		Refuse	Model 2c		Unit-Response ($t + 1$)		
	Item-Nonresponse			Don't Know				
	$\hat{\beta}$	s.e.	$\hat{\beta}_1$	s.e.	$\hat{\beta}_2$	s.e.	$\hat{\beta}_3$	s.e.
intercept	0.966	(1.461)	-0.322	(1.269)	0.652	(1.980)	0.526	(0.337)
<i>respondent</i>								
sex (1 - men)	-0.056	(0.074)	0.079	(0.069)	-0.227***	(0.072)	0.059	(0.063)
age (year)	-0.035***	(0.019)	0.005	(0.020)	-0.074***	(0.018)	0.065***	(0.018)
age squared	0.001***	(0.000)	0.000	(0.000)	0.001***	(0.000)	-0.001***	(0.001)
medium position (ref.)								
low position	0.194**	(0.089)	-0.159*	(0.095)	0.474***	(0.080)	0.201**	(0.087)
high position	0.045	(0.102)	0.127	(0.085)	-0.227*	(0.124)	0.043	(0.090)
children in hh	0.007	(0.077)	-0.063	(0.070)	0.135	(0.077)	-0.049	(0.068)
unsteady working	0.895***	(0.132)	0.156	(0.162)	1.059***	(0.114)		
removal							-0.755***	(0.113)
change of interviewer							0.003	(0.090)
<i>interviewer</i>								
isex (1 - men)	-0.673***	(0.156)	-0.515***	(0.132)	-0.658***	(0.221)	-0.057	(0.113)
iage (year)	-0.076	(0.057)	-0.052	(0.050)	-0.074	(0.078)		
iage2	$0.1 * 10^{-4}$	(0.000)	$0.1 * 10^{-4}$	(0.000)	$0.1 * 10^{-4}$	(0.000)		
<i>situation</i>								
care by interviewer	-0.180***	(0.053)	-0.249***	(0.047)	-0.024	(0.055)		
<i>respondent level</i>								
u_1	u_1		u_1		u_2		u_3	
u_1	0.668***	(0.017)	0.413***	(0.011)				
u_2			-0.014**	(0.007)	0.327***	(0.008)		
u_3			-0.028***	(0.009)	-0.010	(0.008)	0.534***	(0.014)
<i>interviewer level</i>								
v_1	v_1		v_1		v_2		v_3	
v_1	0.811	(0.125)	0.559***	(0.091)				
v_2			0.216*	(0.114)	1.395***	(0.227)		
v_3			-0.032	(0.063)	0.030	(0.105)	0.489	(0.073)
Interviewer cluster	336				336			
persons	3351				3351			
$2 * \text{LogLikel.}$	-4936.28				-25685.5			

NOTE: Asymptotic standard errors in parentheses; Significance: *10%; ** 5%; *** 1%

Source: GSOEP 1986, Sample A, empl. respondents, without self-empl. and trainees, without mail interv. (own calc.)

a male. It may also be that female interviewers accept a don't know statement more readily than males when the respondent has retrieval problems.

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