Schmollers Jahrbuch 123 (2003), 109 – 124
Duncker & Humblot, Berlin

Gross Income Non-Response in the German Socio-Economic Panel – Refusal or Don't Know?*

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Abstract

Many validation studies deal with item non-response and measurement error in earnings data. In this paper we explore motives of respondents who fail to reveal earnings using the German Socio-Economic Panel (GSOEP). The GSOEP collects socio-economic information from private households in the Federal Republic of Germany. We explain the evolution of income non-response in the GSOEP and demonstrate the importance of distinguishing between a refusal to respond and a response of \don't know".

JEL Classification: C 81

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. This paper focuses on item non-response and unit non-response in the German Socio-Economic Panel (GSOEP). We describe the existing literature and try to explain on the basis of a cognitive and rational choice theory why respondents fail to state their income. The GSOEP is a longitudinal representative survey containing socio-economic information on private households in the Federal Republic of Germany (Wagner / Burkhauser / Behringer 1993; Dunn / Frick / Witte 1998).[1]

* In particular I would like to thank Martin David (JPSM) for assistance and valuable suggestions as well as Gert G. Wagner (DIW Berlin, Berlin University of Technology, TUB) and Martin Spiess (DIW Berlin) and Cheti Nicoletti (Tor Vergata University, Rome, Italy) for helpful comments. The usual disclaimer applies.

[1] The GSOEP provides in the public use version also a wealth of methodological information about the survey methods utilized and the characteristics of the interviewers (c.f. Schrapler / Wagner 2001).

2. Item Non-Response – explanations

We have 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.

Several reasons for item non-response are mentioned in the literature. Loosveldt / Pickery / Billet (1999) assume that item non-response occurs when the answering process fails to proceed smoothly because the respondent lacks motivation or ability. Item non-response also depends on the evaluation by the respondents of the questions asked: the questions are too dificult, not interesting, too embarrassing or too threatening (Loosveldt et al. 1999). Furthermore, Burton / Laurie / Moon (1999) express the idea that one can place all potential respondents to a survey on a cooperation continuum. 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.

In rational choice theory the respondent is a decision maker who maximizes her utility. The respondent faces four alternatives which are related to the cooperation continuum: she participates in the survey and answers the income question truthfully; she participates, but reports false, more socially desirable facts; she participates and refuses to answer or has retrieval problems and does not know the answer; she refuses to participate.

Although false reporting can not be ruled out, detecting false reporting requires a true reference value (see Bollinger / David 2001), which is usually not available. We assume serious false reporting is dificult to carry out, because in economic-oriented panel studies like the GSOEP, many variables are related to income and therefore have also to be adjusted by the respondent. Moreover, for consistency, in each wave the false values have to be remembered by the respondent for subsequent waves. Hence, we restrict our analysis to alternatives one, two, four and five.

Table 1 relates to the four alternatives to underlying cognitive problems and respondents assessment and evaluation. The table distinguishes two origins for non-response.

Cognitive Limitations: Unit or item non-response may occur because a respondent cannot participate in the survey, or finds a question too dificult to answer. 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 (c.f. Moore / Stinson / Welniak 2000). Some respondents cannot recall their gross income. This is clearly a

case of the "don't know" response category. Our first hypothesis is that respondents who don't answer a particular question because of cognitive limitations differ from respondents who are not willing to cooperate.

Table 1

Respondent behavior alternatives relating to cognitive or other limitations and respondent's assessment and evaluation

	1. Cognitive and other limitations	2. Respondent's assessment and evaluation	
		benefits	costs
participation	• not possible (moved, sick, dead)	• survey serves a meaning ful purpose • to endorse a scientific or public sponsor • interesting entertainment	• topic too sensitive • topic out of interest • survey not confidential • opportunity costs
response / participation	• cognitive limitations, "don't know" (understanding, retrieval, response production) • doesn't apply	• question serves a meaningful purpose • to endorse a scientific or public sponsor • interesting entertainment	• loss due to disclosure to third parties • loss due to social (un)desirability • loss due to invade of privacy
item-nonresponse / participation		• no fear of social disapproval • keep particular information private • keep particular information confidential	• justification costs (depends on data collection method)
unit-nonresponse		• time for other opportunities • keep privacy • keep confidentiality	• justification costs (depends on data collection method)

Source: own arrangement

Rather than being unable to respond, however, respondents may choose not to cooperate. This decision will be based on their own assessment and evaluation of the interview situation. Income questions belong to the category of sensitive questions. Their content pertains to personal and intimate information. Sensitive questions have several aspects. Tourangeau et al. (2000) distinguish

three of them: risk of disclosure of answers to third parties; social (un)desirability of the answers; and invasion of privacy.

Disclosure to third parties and confidence building: In rational choice theory we can interpret concerns about confidentiality as fear of loss through disclosure to third parties. Individuals appear to vary in the degree of their concern about confidentiality, and this could have an effect on their willingness to cooperate (Singer / Mathiowetz / Couper 1993). As the 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 confidence[2]. Therefore our second hypothesis is that the refusal rate is highest in the first wave and decreases in subsequent waves.

Social desirability: Social desirability has two aspects. First, the respondent may wish 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 to distort their answers because of underlying needs, such as the need for social approval or the need to confirm to social standards (c.f. Tourangeau et al. 2000, p. 257 – 258). Fear of disapproval of low earnings by the more accomplished interviewer may create an incentive for low-wage respondents in need of social approval to refuse to give their earnings (c.f. Smith 1991; Wagner / Motel 1996). Our third hypothesis is that low- earning respondents have a higher refusal rate than high-wage respondents due to the influence of social desirability.

Breach of Privacy: Some non-respondents may have a general aversion to answering intimate questions and think income questions are a breach of privacy. These respondents are identified by less cooperation and have often several refusals in their questionnaire. We can assume that some members of this group are not whole-heartedly cooperative, and have misgivings about the whole process. If their fears are confirmed, they cooperate less. 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 to divulge their income 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.

Justification costs: 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

[2] A change of interviewer is the exception in the GSOEP. Rendtel (1995) has shown that a change of interviewer is a strong predictor for unit non-response.

against expressing the discomfort about discussing income overtly. Therefore, 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. We hypothesize that uncooperative respondents choose self-completion or mail modes of response with higher probability then cooperative respondents. Hence, our fifth hypothesis is that respondents who choose self completion modes have higher refusal rates than in face-to-face modes.

3. Item- and unit non-response in the GSOEP

As a first step, we take a look at the history of the item non-response rate for the gross income question among employed persons in the GSOEP in Sample A (West German residents who are not members of one of the main immigrant groups)[3]. The rates are a result of blank, don't know and refused entries. Special problems occur in the case of the income question for self-employed respondents. The 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 non-response fromabout 10 percent in the first two waves to approximately 6 percent after 12 years. The gross earnings item non-response rate is quite low in comparison to other international and national surveys (Madow et al. 1983, p. 24).

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 preferred method for the survey is face-toface interviews (face). Respondents also may complete the questionnaire by themselves and receive help from the interviewer on demand (self). Sometimes both methods are combined in an individual interview (not shown in the figure). A few responses are elicited by mail when respondents would otherwise fail to cooperate (mail). Figure 1 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 unitnonresponse in the following wave in figure 2. The mode "mail" can be interpreted as a strong indicator for poor cooperation.

[3] The annual question for all employed respondents is: "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."

Table 2

Item Non-Response-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, "don't know" or refused entries.

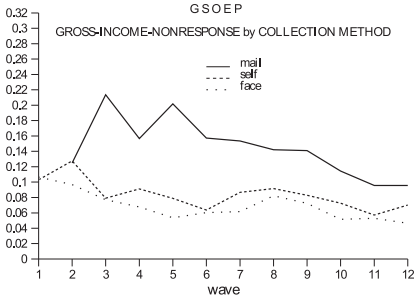

Figure 1: Share of incomenonresponse by data collection methods from 1984 – 1994, Sample A, employed persons.

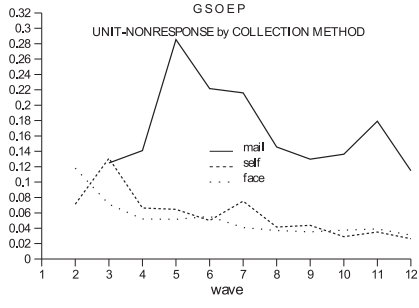

Figure 2: Share of unitnonresponse by data collection methods in the last wave from 1985 – 1995, Sample A, employed persons.

We have to use another measurement to distinguish refusals from don't know. 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. Respon-

dents who state their net income reveal that they are not concerned about the sensitivity of the income question. 46% of all missing values for gross income fall in this category. We assume that employed respondents with missing values for both items have refused to answer (54%)[4].

To show the influence of income on income non-response we classify occupation into three skill groups (table 3). The groups are based on type of position (wage, salary, or civil service) and occupational skills. Figure 3 and 4 display the distributions by skill group. The share for the "don't know" category is shown in figure 3, while figure 4 shows the refusal rate. The high skilled have the highest refusal rates, followed by the medium and low skilled. The refusal rate declines for all occupational states. A stable high proportion of low skilled don't know their gross income but report valid net incomes. This finding is evidence against our third hypothesis: the low skilled do not fail to report their income due to social (un)desirability, but rather due to cognitive limitations. It might be that their monthly gross income varies and it is easier for them to recall their take-away income (net income).

Table 3

Classification of Skill Groups

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

To control for further respondent and interviewer variables, we estimate multilevel regression models. 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 level. The appropriate method of analysis is the use of hierarchical or multilevel models that estimate

[4] This method of distinguishing the two types of response behavior is supported by another survey, the British Household Panel Study (BHPS). The BHPS distinguish between 'don't know' and 'refusals'. Approx. 80% of the 'don't knows' for gross-income are connected with valid net-income in the BHPS (Schräpler 2002b).

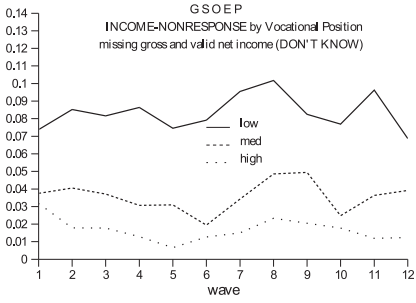

Figure 3: Share of missing grossand valid net income respond by occup. status, 1984 – 1994, Sample A, empl. respondents.

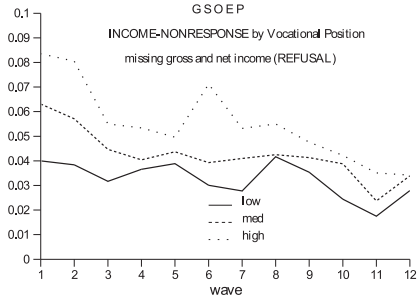

Figure 4: Share of missing grossand net income by occupational status, 1984 – 1994, Sample A, employed respondents.

both the interviewer variance and the effects of explanatory variables measured at the interviewer and the respondent level (c.f. Hox 1994; Pannekoek 1991; Hill 1991). We first estimate a simple univariate probit model with the dependent variable equal to one if the individual provides no income data, and zero otherwise. Next, using the same sample, we estimate a multivariate probit model: three probits for the presumed refusal to give income information, the presumed response 'don't know' and unit response (participation) in the next wave, respectively with correlated error structures. The errors are correlated at the period, respondent and interviewer level, reflecting the hierarchical nesting of the data. Level 1 represents the different response variables of the component probits of the multivariate model. We define $i = 1$ (refuse), $i = 2$ (don't know) and $i = 3$ (unit-response). Level 2 represents the different times of measurement j. Level 3 consists of k respondents and level 4 represents the aggregate level, which is formed by l interviewers.

For person k and interviewer l three dichotomous variables y_{ijkl} are observed at time j.

$$(1) \qquad y_{1jkl} = \begin{cases} 1, & \text{if } y^*_{1jkl} > 0, \text{ refuse} \\ 0, & \text{otherwise} \end{cases}$$

$$(2) \qquad y_{1jkl} = \begin{cases} 1, & \text{if } y^*_{2jkl} > 0, \text{ don't know} \\ 0, & \text{otherwise} \end{cases}$$

$$(3) \qquad y_{1jkl} = \begin{cases} 1, & \text{if } y^*_{3jkl} > 0, \text{ unit-response (next wave)} \\ 0, & \text{otherwise} \end{cases}$$

We use a multivariate probit model with four levels:

$$y_{ijkl} = \pi_{ijkl} + u_{ijkl} \ . \tag{4}$$

where u_{ijkl} is a well-behaved error.

The probability π_{ijkl} for each response variable i is estimated from:

$$\pi_{ijkl} = \Phi\left(\beta_{0ikl} + \sum_{h=1}^{H} \beta_{h,i} x_{h,ijkl} + v_{0,jkl} + f_{0,il}\right) \tag{5}$$

Φ is the cumulative distribution function of the standard normal distribution, while $x_{h,ijkl}$ represent values for covariates $x_h (h = 1, \ldots, H)$ of person k and interviewer l at time j. The intercept β_{0ikl} is specified as random on level 3 (respondent level) and level 4 (interviewer level), hence we get individual and interviewer random effects, and the variance is estimated as $v_{0,ikl}$ and $f_{0,il}$. The random variation among the time periods on level 2 isestimated as the variance / covariance u_{ijkl}. Since these are dependent binomial variables[5], the residual variances $\sigma^2_{u_{ii}}$ and covariances $\sigma^2_{u_{ii'}}$ must be estimated.

Estimation requires two assumptions:

Assumption 1.: The second, third and fourth level errors are assumed to be independent, so $\text{cov}(u_{ijkl}, v_{ikl}, f_{il}) = 0, \forall i, j, k, l$.

Assumption 2.: The coefficients for the covariates in the multivariate probit model are time invariant.

4. Estimates

Table 4 shows the estimates of the univariate (model 1) and the multivariate probit model (model 2) for wave $1-7$.[6] The sample contains a total of 23,347 observations on 8,797 respondents from 627 interviewers. The equation in model 1 (column 0) refers to gross income non-response and is used for comparison only. In model 2, the two probits for "refuse" and "don't know" (column 1 and 2) partition the sample. The third equation in model 2 (column 3) refers to unit response in the following wave.

Estimates of the parameters for respondent variables are important for our first hypothesis. The estimates confirm the results of the descriptive analysis above: respondents who refuse to divulge their income are primarily the highly skilled (high position, column (1): $\hat{\beta}_1 = 0:086$) and respondents who don't know their gross income are mainly workers with irregular employment

[5] Often 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).

[6] The analysis is done with MlwiN 1.2 (Rasbash et al. 1999).

Table 4

Multivariate Multilevel Probit-model for income-nonresponse, wave 1 – 7

	Model 1 (0) Item-Nonresponse		Model 2 (1) Refuse		(2) Don't Know		(3) Unit-Response $(t+1)$	
	$\hat{\beta}$	s.e.	$\hat{\beta}_1$	s.e.	$\hat{\beta}_2$	s.e.	$\hat{\beta}_3$	s.e.
Intercept	-0.790***	0.164	-1.488***	0.201	-1.100***	0.190	1.177***	0.151
respondent								
sex (1 – men)	-0.119***	0.041	-0.012	0.052	-0.210***	0.047	-0.066**	0.032
age (year)	-0.024***	0.008	-0.007	0.010	-0.028***	0.009	0.018**	0.008
age squared	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
medium position (ref.)								
low position	0.139***	0.033	-0.110**	0.040	0.306***	0.038	-0.094***	0.027
high position	0.048	0.037	0.086**	0.042	-0.131***	0.051	0.055	0.031
dep. children in HH	0.010	0.029	-0.038	0.034	0.097***	0.036	-0.007	0.025
unsteady working	0.500***	0.052	0.256***	0.063	0.663***	0.058		
move							-0.327***	0.025
interviewer								
isex (1 – men)	-0.211***	0.069	-0.167***	0.072	-0.225***	0.092	0.051	0.054
interaction								
both female	0.021	0.059	-0.033	0.076	0.028	0.065		
situation								
change of interviewer							-0.140***	0.025
care 2 years	-0.105***	0.030	-0.112***	0.032	-0.048	0.047		
care more than 2 years	-0.133***	0.037	-0.126***	0.041	-0.065	0.052		
self completion	0.054**	0.026	0.203***	0.028	-0.210***	0.039		

	Model 1 (0) Item-Nonresponse		Model 2 (1) Refuse		(2) Don't Know		(3) Unit-Response $(t+1)$	
	$\hat{\beta}$	s.e.	$\hat{\beta}_1$	s.e.	$\hat{\beta}_2$	s.e.	$\hat{\beta}_3$	s.e.
wave 1 (ref)								
wave 2	0.042	0.037	0.057	0.040	0.021	0.057	-0.0168***	0.025
wave 3	-0.059	0.043	-0.061	0.047	-0.045	0.064	-0.286***	0.025
wave 4	0.092*	0.047	-0.054	0.051	-0.102	0.069	-0.389***	0.026
wave 5	-0.099*	0.050	-0.053	0.054	-0.115	0.072	-0.502***	0.026
wave 6	-0.119**	0.051	-0.056	0.056	-0.168**	0.074	-0.542***	0.027
wave 7	0.040	0.054	-0.085	0.060	0.012	0.075	-0.539***	0.028
period level								
	u		u_1		u_2		u_3	
u_1	0.478***	0.006	0.357***	0.004				
u_2			-0.045***	0.004	0.742***	0.008		
u_3			0.000	0.003	0.001	0.004	0.257***	0.003
respondent level								
	v		v_1		v_2		v_3	
v_1	1.081***	0.029	2.143***	0.047				
v_2			-0.001	0.029	0.438***	0.033		
v_3			-0.175***	0.028	0.005	0.024	1,714***	0.033
interviewer level								
	f		f_1		f_2		f_3	
f_1	0.376***	0.033	0.295***	0.033				
f_2			0.061**	0.032	0.770***	0.062		
f_3			0.008	0.020	-0.006	0.027	0.211***	0.023
ρ_{int}			0.078		0.261		0.020	
Interviewer cluster	627				627			
persons	8797				8797			
N	23347				23347			
-2 * LogLikelih.	-2,716.62				-39,121.9			

Note: Asymptotic standard errors in parentheses; Significance: _10%; _ _ 5%; _ _ _1%
Source: GSOEP 1984 – 1989, Sample A, empl. resp., without self-empl. and trainees, without mail interv. (own calc.)

(unsteady working, column (2): $\hat{\beta}_2 = 0.663$) or low skilled (low position, column (2): $\hat{\beta}_2 = 0.306$). We find significant effects for respondents working irregularly for both non-response variables and the estimates demonstrate that the impact is much stronger for "don't know" rather than refusal. Furthermore, respondents who don't know their gross income are disproportionaly female (sex, column (2): $\hat{\beta}_2 = -0.210$). The presence of children in households increases the probability of "don't know" non-response (dep. children in HH, column(2): $\hat{\beta}_2 = 0.097$).

Overall, these findings support our first hypothesis: 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 wish to reduce item non-response rates.

Our second hypothesis predicts higher refusal rates in the first contact because of building trust in subsequent waves. This assumption of a 'positive panel effect' is supported by our findings. The variables "contact 2 years" and "contact more than 2 years" measure the number of successful contacts between respondent and the same interviewer. Several contacts with the same interviewer will change the interview situation. The estimates show that continued interviewing by the same interviewer decreases refusals for gross income (contact 2 years, column (1): $\hat{\beta}_2 = -0.112$; contact more than 2 years, column (1): - 0.126). A strong effect relates to interviewer gender (isex). Female interviewers elicit significantly more don't knows (isex, column (2): $\hat{\beta}_2 = -0.225$) and refusals (isex, column (1) : $\hat{\beta}_1 = -0.167$) than male interviewers. This suggests that both refusing and responding "don't know" depend on the interview situation created by the interviewer.

Our third hypothesis is that respondents with low skill have higher refusal rates than high{earning respondents due to social desirability. This does not appear to be the case. The estimates show that a high percentage of missing values of low-skill respondents results from don't know responses (low position, column (2): $\hat{\beta}_2 = 0.336$). By contrast, we find a higher probability of refusals in the case of the high and medium skilled. These estimates reveal increasing refusal rates 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 2 consists of three covariance matrices. The random variation among respondents is estimated as the variance / covariance v_{ijkl}. The estimates in the table 4 show a small but highly significant negative covariance between the error terms of "Refuse" and "Unit response in the following wave": model 2, column (1): $\sigma_{v_1 v_3} = -0.175$ (correlation $r_{u_1 u_3} = -0.092$). The covariance among the error term of "Don't know" and "Unit response" is not significant (column (2)). Although the value of $r_{u_1 u_3}$ is not high, it supports the idea of a cooperation continuum: employed

respondents who refuse to give their income tend to drop out of the survey in the following wave.

Our fifth hypothesis predicts a higher refusal rate in a self reporting mode (SELF) than in face-to-face interviews because of lower social barriers and justification costs. We suppose that it is easier for the respondent to refuse an answer in this mode. The estimates confirm this hypothesis, they show that the probability for "refusals" is significant higher (SELF, column (1): $\hat{\beta} = 0.203$) in the case of a self completion method than in a face-to-face or mixed method. Moreover, respondents who choose the self reporting mode have a lower probability for "don't know" responses (SELF, column (2): $\hat{\beta} = -0.210$).

Finally, we examine the random variation of the intercept $^{-}0;il$ on level 4 (interviewer level). The interviewer variability is significant in all equations. The share of the entire error variance ρ_{int}, often called intraclass correlation, or interviewer effect, indicates a significant interviewer influence and / or a significant area effect to all three response behaviors, but especially for don't know ($\rho_{int(2)} = 0.261$). Unfortunately this finding is difcult to interpret, as we can't distinguish between interviewer and area cluster because the interviewers are not assigned randomly to the sample points.

5. Conclusions

A primary finding in this analysis is that refusals and don't knows relate to different respondent characteristics. The description and the estimates in the multivariate analysis provide evidence for our first hypothesis, that the respondent characteristics for refusal and don't know responses differ markedly. Respondents who refuse to answer are mainly in high{skill positions. Respondents who do not know their incomes are particularly likely to be females, respondents in low occupational states and respondents who work irregularly. This finding is important for the interpretation and reduction of item non-response. Many studies try to predict item non-response with respondent characteristics, but fail to distinguish refusals from don't knows. The resulting conclusions are ambiguous and hard to interpret, which may be the reason for the inconsistency in this area.

The second relevant finding is that survey respondents fall on a cooper-ation continuum. Respondents who refuse to answer the sensitive questions (e.g. income) because of privacy concerns are often not whole-hearted survey cooperators and have misgivings about the whole process. They drift to the end of the cooperation continuum and are harder to persuade to participate in the following wave. The estimates of our multivariate probit model support this hypothesis, as we find a small negative but significant correlation between refus-

ing 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 interviewer and / or the area has a strong effect on a respondent's propensity to give refusals and don't know responses. The identifiable systematic effect: 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 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.

We recommend that the GSOEP provide follow{up questions to the gross income question, in order to reduce the non{response rate by helping respondents who do not know their exact gross income. The follow{up questions could provide various income categories for a respondent to choose. Furthermore, since refusals partly lead to later non{participation in the following wave of the survey, it is important to devote resources to reducing this kind of non-response.

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