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Dynamic Modelling of Nonresponse
in Business Surveys

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Dynamic Modelling of Nonresponse in Business Surveys

Abstract

It is well-known that nonresponse affects the results of surveys and can even cause bias due to selectivities if it cannot be regarded as missing at random. In contrast to household surveys, response behaviour in business surveys has been examined rarely in the literature. This paper is one of the first which analyses a large business survey on micro data level for unit nonresponse. The data base is the Ifo Business Tendency Survey, which was established in 1949 and has more than 5,000 responding firms each month. The panel structure allows to use statistical modelling including time-varying effects to check for the existence of a panel fatigue. The results show that there are huge differences in business characteristics such as size or sub-sector and that nonresponse is more frequent in economically good times.

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1 Introduction

Data collection is the essential tool and fundamental for all empirical studies. In socioeconomic sciences the methods used are mostly surveys. These surveys often face the problem of nonresponse, i.e. partial or complete drop out of information. In contrast to one-time studies, nonresponse in panel surveys is much more problematic, because the same units are analysed over time. Since panel studies with sociological or economic background mostly base on household or population surveys, a large literature exists on techniques for reducing the effect of nonresponse, see Groves et al. (2002). In contrast, only less is known about the processes and reasons for participation and responding behaviour in business surveys (Janik and Kohaut, 2011). Although individuals fill the questionnaire, they are representatives of an organisation, so organisational relationships have to be considered as mentioned in Tomaskovic-Devey et al. (1995).

This paper is one of the first that models unit nonresponse behaviour in business surveys on micro level. To this end we examine the Ifo Business Survey (IBS) for unit nonresponse. The most well-known result of this survey is the *Ifo Business Climate Index*, one of the most prominent economic indicators for the German business cycle. Because the IBS is a survey performed since 1949 with more than 5,000 respondents each month, it provides a large amount of data with panel structure. In contrast, former empirical studies on nonresponse mainly focussed on the aggregate response rate, in particular explaining effects of survey characteristics. Others like Harris-Kojetin and Tucker (1999) examine the relationship between political

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and economic indicators and nonresponse rates using ARMA models. Steel et al. (1996) showed that, in general, results from macro level analysis cannot be transferred directly to the individual level, because the nonresponse rate is the aggregation of many individual decisions. In recent years more studies were realised to analyse nonresponse on micro data level, for example Lepkowski and Couper (2002), Kalsbeek et al. (2002), and Schräpler (2004). They all use (multivariate) logit or probit models for statistical modelling but do not include dynamic effects since most of them use one-time surveys. For panel studies, Laurie et al. (1999) argue that the main problem is the phenomenon of 'panel fatigue', i.e. the respondents may lose interest in taking part in the survey with running participation time. However, as analyses incorporating time-effects need long panels for good parameter interpretation, such models related to nonresponse studies can be found rarely. For example, Hawkes and Plewis (2006) use dynamic models for analysing nonresponse in six successive cohort studies. With our data, we are able to investigate the estimation of long-running time effects, such as panel fatigue. Also, we can include variables which may vary about the calendar time.

Therefore, this paper is organised as follows: Section 2 gives an overview of the survey and introduces the data set in detail. Statistical methodology is presented in Section 3. As we analyse panel survey data, this needs some modifications to enalbe unbiased estimates which will also be shown. Section 4 sums up the empirical findings and gives a short outlook how to adress missing values in business surveys.

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2 The IBS Data

The Ifo Business Survey is a monthly panel survey that has been conducted by the Ifo Institute in 1949. The IBS monitors German companies and collects data on different aspects of their business parameters, such as business situation, business expectations, demand situation or change in staff. For an overview of the collected variables, see Becker and Wohlrabe (2008). Due to structural changes in the last 60 years, new companies were constantly asked to participate in the IBS. For this purpose, letters are sent with a request to participate and, if the company agreed, the firm was included into the monthly IBS. For more methodological background of the survey see Goldrian (2007). In total, the share of German industrial production represented in the survey is at 40%. The construction sector is covered with 14%, the trade sector with 5% of total employment in Germany. Although the survey was introduced in 1949, identification of single units is only possible since January 1994 (industry) and April 1994 (construction and trade), respectively.[1] Therefore, we have to restrict our analysis to the period from January 1994 to December 2009.

A specificity of the survey is that a single firm can answer more than one questionnaire if the company operates in various business areas. This applies in particular to larger companies. For each of these areas, the company is asked to fill a separate questionnaire which is done by different persons. We therefore assume that independence between two subenties is given,

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[1]The monthly data sets are available at the Economics & Business Data Center (EBDC), a combined platform for empirical research in business administration and economics of the Ludwig Maximilian University of Munich (LMU) and the Ifo Institute for Economic Research.

even if they belong to the same company. For reasons of simplicity, in this paper each report is treated as coming from a different company, i.e. the number of 'respondents' ('companies', 'firms', etc.) represents the number of sent questionnaires.

2.1 Variables

There are many 'risk factors' that may influence the response behaviour in business surveys. In this paper, we categorise them according to the conceptual framework of Willimack et al. (2002). This framework distinguishes two major categories of variables: Firstly those factors which are under the control of the researcher, related to survey design (time schedule, instrument design, etc.) and secondly those factors out of researchers control. The latter can be divided into three groups: External environment (such as 'survey taking climate' and economic conditions), the business (characteristics, organisational structure) and finally the attributes of the respondent (authority, motivation). Based on this framework, it will be discussed which of these variables can be incorporated into the analysis and which additional variables will be included that cannot be classified into one of these categories. All variables which enter the final model in Section 4 are listed in Tables 1 and 2.

2.1.1 Survey Design

Since the manufacturing sector can be regarded as the 'cycle maker' of the German economy, the IBS was first introduced in 1949 in industry. The ex-

tension of the survey to other sectors was carried out 1950 in trade and 1956 in construction. Due to the different structure of these sectors, the questionnaires are not identical, e.g. the question to the capacity utilization is not meaningful answerable for the trade sector companies. However, the questionnaire for each sector has undergone very minor changes. One of these small changes concerned the number of questions which consists of standard and special questions. The latter are asked each quarter, half year or once a year. A major change, which affected the level of content of the questionnaire, was in January 2002 when the survey was reorganised for the Joint harmonised European Union programme of business and consumer surveys (for more information see European Union, 2006). Before 2002, all questions asked in month t collected information on data from the prior reporting month $t - 1$. This change has affected the content only marginally, but clearly has implications for the time schedule. Since January 2002, potential respondents are asked to provide information from the current month t. This is a problem in December when the survey results have to be published five days before Christmas instead of five days before months' end. In the analysis, a dummy variable for short time schedule is introduced, which indicates all Decembers since 2002. Actually, the number of days to answer the questionnaire would be interesting, but these data are only available since 2003. In order to avoid a strong reduction of the data set, this information cannot be included into the analyses.

2.1.2 The Business

To control for effects of business characteristics, the size of the company and the subsector the company is working are included in the regression analysis. For the construction firms, controlling for different nonresponse behaviour across the subsectors is not possible because the companies report for all working areas in one questionnaire. In order to account for structural differences between the sectors, several weighting characteristics for the aggregation of the indicators are taken in the survey: Firms from industry and construction are categorised by the number of employees whereas trade companies by their annual sales volume. Note that this information is collected for the different subentities of the business and is updated once a year. However, it is likely that there are only minor changes within a year, so that this low frequency should be negligible. Furthermore, we abstract differences in regional response behaviour, but account for differences between companies from the former Eastern and Western states. Figure 1 shows the nonreponse rates for Eastern and Western German firms. It is clear that there was a transition period when the IBS was established after the reunification of Germany in the states of the former GDR. In the mid-1990's the nonresponse rate of Eastern German firms was about 50% and drew closer to the Western German with the course of time.

2.1.3 The Respondent

Tomaskovic-Devey et al. (1994) pointed out that the authority of the respondent is important for the answering behaviour. For the IBS, characteristics

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of the respondent, such as gender, age and position in the company are not available, even not on annual frequency. Abberger et al. (2009) undertook a meta survey directed to this question in spring 2009 with respect to trade firms. Since this was an one-time survey these data were not merged with the IBS panel; in particular, no information for older firms is available. Therefore, an authority variable cannot be included into the data analysis. The same applies to capacity and motivation of the respondent. However, in Section 3.2 we will show how we can reflect this firm-specific heterogeneity to a certain extent.

2.1.4 External Enviroment

An external aspect of responding behaviour are economic conditions prevailing at the time of the survey. Harris-Kojetin and Tucker (1999) found lower cooperation in a population survey in periods of economically better times. As the IBS focuses on economic parameters of the companies, there is a variety of possible indicators for the current economic situation of the single firm. But obviously, there are no answers available in months of non-participation. Instead of this, economic indicators taken from the survey results can be used. The Ifo Institute computes business situation indicators for each (sub)subsector, so the indicators from the lowest available aggregation level (where each firm is classified to) are used as an approximation of the business situation of the single firm in the appropriate (sub)subsector. This approach can be problematic because these indicators are aggregated results from the participating subjects. Still it allows a deeper insight into

possible selectivities related to the business cycle. If, in fact, the responding behaviour depends on the business cycle, nonresponses depend from the investigated latent variable and thus, estimates can be biased. As mentioned above, there is no data for the subsectors of construction, so the indicator for the whole sector is integrated into the model. To validate our results, we also run a regression model containing the GDP growth rates of Germany, which are to be forecasted with the IBS results. In particular, the Ifo Business Climate Index is used for forecasting, for an overview see Abberger and Wohlrabe (2006).

Groves et al. (2004) mentioned that the intensity of survey research can be a reason for nonresponse. This 'survey taking climate' can be affected by the number of requests for survey participation the company receives each month. Lacking data about the total number of requests, there is information about additional surveys conducted by the Ifo Institute, i.e. if the company received an extra questionnaire in a given month. Also the number of questions can be interpreted as an indicator for increasing intensity of survey research.

2.1.5 Additional variables

Several studies found evidence for declining interest in survey participation over the last decades (for an overview see de Leeuw and de Heer, 2002). Brehm (1994) points out that all institutions that organise surveys (academic, governmental, business and media) suffer from declining response rates. Therefore, the variable *calendar time* is included into the

model, counting months since January 1994 (i.e. 1 for 01/1994, 2 for 01/1994, ..., 192 for 12/2009). This variable allows to control for general trends in responding behaviour between 1994 and 2009. Besides calendar time, the *length of participation* in months t is available for all units, i.e. it represents the t-th month the company received a questionnaire. This variable allows to investigate the effect of panel fatigue. However, notice that the first month of participation is available (and makes it possible to calculate the exact participation month) even for all units which are leftcensored due to the missing IDs before January 1994. As the IBS was established in 1949, there are still active companies which obtained more than 700 participation months. Another problem to face is the difference of vacation and working days, which speaks to the number of available days to respond. But because the vacation days differ significantly between the German states, we include both variables into the analysis.

2.2 Descriptive analysis

Covering the period from January 1994 to December 2009, the total number of observations (including nonresponse) is 659,650 from 6,822 firms in industry (with an average nonresponse rate of 14.5%), 204,318 from 3,967 firms in construction (23.4%) and 277,256 from 4,152 firms in trade (22.1%). Figure 2 shows the nonresponse rates for the three sectors by calendar time. Table 1 gives an overview of all non-sector specific variables and table 2 over the sector-specific. For the empirical analysis the medium categories for the companies' size is chosen as reference category.

Table 1: Description and distribution of non-sector specific variables

CATEGORY	VARIABLE	ABBREVIATION	VALUE	PERCENTAGE
Survey design	Number of questions	*questions*	-	-
	Short time schedule in December	*shorts*	short time schedule	3.8
Business	Location	*east*	company located in Eastern Germany	24.7
	Size of the company	*size*	(see table 2)	
	Subsector of the company	*subsector*	(see table 2)	
External Environment	Business situation index in the (sub)sector	*business situation, bs*	-	
	Received an additional survey by Ifo	*add survey*	additional survey	8.0
Additional variables	Calendar time	*calendar time, ct*	-	
	Vacation days in the federal state	*vacation days*	-	
	Working days in the federal state	*working days*	-	-

Table 2: Description and distribution (by sector) of sector specific variables

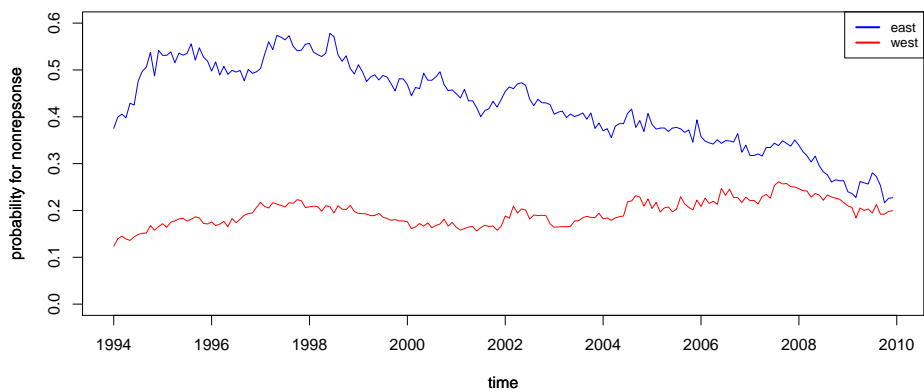| SECTOR	VARIABLE	ABBREVIATION	VALUE	PERCENTAGE
Industry	Size of the company (no. employees)	*size*	< 100 employees (smallest)	48.9
			100-199 employees (small)	17.7
			200-499 employees (medium)	18.1
			500-999 employees (large)	8.2
			>1,000 employees (largest)	7.2
	Subsector	*subsector*	Food & tobacco	6.4
			Textiles, textiles products & leather	7.1
			Wood	4.1
			Pulp, paper, publishing & printing	15.6
			Petroleum & chemical products	5.2
			Rubber & plastic products	6.8
			Other non-metallic mineral products	6.4
			Basic metals & fabricated metal products	12.3
			Machinery & equipment	16.0
			Electrical & optical equipment	12.2
			Transport equipment	2.9
			Furniture & manufacture n.e.c.	4.9
Construction	Size of the company (no. employees)	*size*	< 100 employees (smallest)	54.6
			100-199 employees (small)	24.0
			200-499 employees (medium)	12.0
			500-999 employees (large)	5.9
			>1,000 employees (largest)	3.6
Trade	Size of the company (annual sales volume)	*size*	< 1.0 million (smallest)	25.4
			1.0-5.0 million (small)	28.7
			5.0-12.5 million (medium)	18.6
			12.5-50.0 million (large)	20.4
			> 50.0 million (largest)	7.0
	Subsector	*subsector*	Motor trade	10.4
			Wholesale trade	47.5
			Retail trade	42.1

Figure 1: Nonresponse rate for Eastern and Western German firms in the IBS
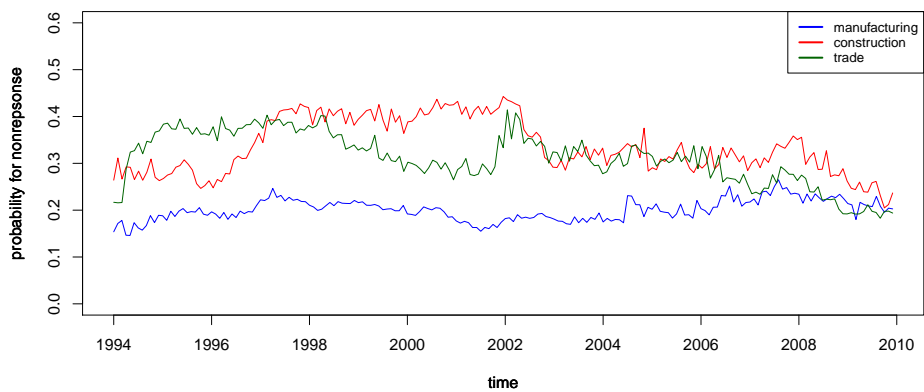

Figure 2: Nonresponse rate according to the three different main sectors in the IBS

3 Methodology

3.1 The basic model

All variables presented in Section 2 have a panel structure, so the data set has the form $(y_{it}, x_{it}), i = 1, \ldots, N$ and $t = 1, \ldots, T$, where $N = 14,941$ denotes the number of companies and $T = 192$ the waves of the survey since January 1994. Given that the dependent variable is an 1/0-dummy, $y_{it} = 1$ if company i did not answer the questionnaire in the t-th wave since January 1994 and $y_{it} = 0$ if it was observed in the data. The mean function $\pi_{it} = E(y_{it})$ can be written as a *Generalized Linear Model* (GLM)

$$g(\pi_{it}) = \eta_i = \beta_0 + x_{it}\beta \tag{1}$$

with and an appropriate link function $g(\cdot)$, such as logit or probit, and a $(1 \times K)$-matrix x_{it}.

3.2 Unobserved heterogeneity

As we analyse panel data, y_{it} may be correlated across t so the i.i.d.-assumption could be violated. To correct for such effects, we extend equation (1) to a marginal model by using the *Generalized Equation Estimation* (GEE) approach developed by Liang and Zeger (1986). GEEs are part of the wide range of quasi-likelihood methods, which were introduced first by Wedderburn (1974). Quasi-likelihood methods only require a given relationship between y and x and the relation of the conditional mean and the variance

of y. Therefore, the mean function in GEEs can be defined as in a GLM, i.e. of form (1). The variances $\text{Var}(y_i)$ have to be written as a function of the mean μ_i, i.e.

$$\text{Var}(y_i) = \phi \, v(\mu_i)$$

where ϕ is a common scale parameter and $v(\cdot)$ the known variance function. To obtain estimates for the slope parameters β, K 'quasi-score' functions

$$S_k(\beta) = \sum_{i=1}^{n} \frac{\partial \mu_i'}{\partial \beta_k} \, \text{Cov}(y_i)^{-1}(y_i - \mu_i) = 0, \qquad k = 1, \ldots, K,$$

have to be solved. If the model is correctly identified, $\text{E}[S_k(\beta)] = 0$ and $\text{Cov}[S_k(\beta)] = \frac{\partial \mu_i'}{\partial \beta_k} \text{Cov}(y_i) \frac{\partial \mu_i}{\partial \beta_k'}, \forall k$. In cases of panel data, the form of the dependence across t has to be pretended. This is done by a specification of a $(T \times T)$ working correlation matrix $R_i(\boldsymbol{\alpha})$, which is completely described by $\boldsymbol{\alpha}$. Then,

$$\text{Cov}(y_i) = \phi \, V_i^{1/2} R_i(\boldsymbol{\alpha}) V_i^{1/2}$$

is the corresponding working covariance matrix of y_i with $V_i = \text{diag}(v(\mu_i))$ and $\dim(V_i) = T \times T$, see Heagerty and Zeger (1996). Common working correlation matrices, especially for small data sets, are $R_i(\boldsymbol{\alpha}) = \alpha$ ('exchangeable') or $R_i(\boldsymbol{\alpha}) = \alpha^{|t-s|}$ ('autoregressive', here AR(1)) $\forall t \neq s; s, t \in 1, \ldots, T$ since only one parameter α has to be estimated.

Notice, that the working correlation has to be specified properly to enable consistent estimates of $\text{Var}(\hat{\beta})$. In cases of misspecification, $\text{Var}(\hat{\beta})$ is still

normal but not equal to $\left(\frac{\partial \mu_i'}{\partial \beta_k} \mathrm{Cov}(y_i) \frac{\partial \mu_i}{\partial \beta_k'} \right)^{-1}$. A robust variant was proposed by Liang and Zeger (1986) by using a so-called Huber-White sandwich estimator (see Huber, 1967 and White, 1982):

$$\mathrm{Var}(\hat{\beta}_k) = N \left(\sum_{i=1}^{N} \hat{D}_i' \hat{C}_i^{-1} \hat{D}_i \right)^{-1} \left(\sum_{i=1}^{N} \hat{D}_i' \hat{C}_i^{-1} W_i \hat{C}_i^{-1} \hat{D}_i \right) \left(\sum_{i=1}^{N} \hat{D}_i' \hat{C}_i^{-1} \hat{D}_i \right)^{-1}$$

with $\hat{D}_i' = \partial \mu_i' / \partial \hat{\beta}_k$, $\hat{C}_i = \mathrm{Cov}(y_i)$ and $W_i = (y_i - \hat{\mu}_i)(y_i - \hat{\mu}_i)'$ as the empirical covariance estimator. This robust estimate is consistent even under misspecification of the correlation matrix and therefore widely used in literature, see Zorn (2001).

3.3 Unit-Weighting

Our model specified above implies that all units in the data set have the same probability to enter the survey. For business surveys, this is highly discussable as bigger firms commonly represent more than one unit and therefore have a higher probability for inclusion. This is also the case in the IBS where nearly all large firms are included for certain. We therefore introduce weights account to for this. From table 2 we know that their is information on the size of the company by five different size ranges: smallest, small, medium, large and largest. As the bounds of the categories have an approximately quadratic order, we give the following unit weights $\omega_i^{company}$ to the units: 1 for smallest, 4 for small, 9 for medium, 16 for large and 25 for largest. In addition, we include strata weights $\omega_i^{subsector}$ according to the German Classification of Economic Activites (Statistisches Bundesamt, 2008) of

the companies' subsector. Therefore, the final unit weights are

$$\omega_i = \omega_i^{company} \cdot \omega_i^{subsector}.$$

At this point, we have to mention that the results differ only marginally on the type of weighting. Even an unweighted regression leads to similar results.

4 Results and Discussion

All variables described in Section 2 and listed in Tables 1 and 2 are potential factors that may influence the responding behaviour. They enter the model as follows:

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\begin{aligned}
\eta_t \;=\; & \beta_0 + t\,\beta_t + calendar\ time\ \beta_{ct} + (calendar\ time \times east)\,\beta_{ct \times east} \\
& + east\ \beta_{east} + size\ \beta_{size} + subsector\ \beta_{subsector} \\
& + short\ ts\ \beta_{short\ ts} + vacation\ days\ \beta_{vac\ days} + working\ days\ \beta_{work\ days} \\
& + add\ survey\ \beta_{add\ survey} + questions\ \beta_{questions} + cycle\ indicator\ \beta_{cycle}
\end{aligned}
$$

with a logit link function. Note that β_{size} and $\beta_{subsector}$ are vectors and the reference category for $\beta_{subsector}$ is the construction sector. The interaction term $(calendar\ time \times east)$ is included into the model as we saw in Section 2.2 that the responding behaviour differs strongly between Eastern and Western firms over calendar time. As defined in Section 2.1.4 *cycle indicator* represents two different indicators: The lowest business situation indicator from the survey results and the GDP growth rates in Germany.

4.1 Interpretation of the results

The results in Table 3 show that with rising participation time, the respondents less likely fail to respond. Therefore, a panel fatigue in the sense of declining trend in participation can not be found here. Our results confirm those in Janik and Kohaut (2011), who also examine the response behaviour of German companies, but do not model dynamics since they use only the 2006 data from the IAB Establishment Panel. They also found a declining trend with rising participation time. It can be supposed that in panel surveys, companies need some time until the collection of information (in which maybe various departments are involved)[2] becomes regular. As different studies mentioned in Section 2.1.5, we also find evidence for a general declining trend in participation (see the coefficient for $calendar\ time$). However, our analysis shows that the willingness to participate has increased for the Eastern German firms. Still, this effect can be interpreted that there is a transition period when a existing panel is introduced into a new region and the survey has to become established with time. At this point, it should also be noted that the interaction term $calendar\ time \times east$ is necessary to include into the model as in these cases the main effect $calendar\ time$ would change the sign.

With exception of the number of working days, all 'survey design related' variables show the supposed effects. However, the number of working days only have less variation and thus the 95% confidence interval includes the 0. Sending an additional survey to the respondents seems to increase the

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[2]In Abberger et al. (2009) can be seen that different departments are involved in the answering of the IBS.

probability for nonresponse, but the effect is far away from being significant. In contrast, an increasing number of questions as well as vacation days reduces the willingness to participate with certain. It can be assumed that the respondent is more likely not in office in the holidays' season and therefore has less time to fill the questionnaire. Also, the short time schedule of the IBS in December since 2002 has a negative impact on the reponse rates.

The responding behaviour also varies for different business' sizes: Basically, larger firms tend more likely to respond than smaller ones. Although organisational performance generally rises with the size of the company, we suppose that they may benefit more from the survey results than the smaller firms and therefore are more willing to respond regularly. However, these effects are only significant when using a GLM without the GEE part.[3] The same applies to the different business areas. With exception of the trade firms, nearly all sectors are insignificant. From a theoretical point of view it seems that there is no reason for a different responding behaviour. In the case of trade companies can be assumed that the topic of the survey (and their results) is not as interesting because the trade sector generally does not dependent on the economic cycle so strongly than the other sectors. Although the results suggest some general effects, the individual structure of the company seems to be more decisive for the decision to respond. Comparable analysis without the GEE part show that these business-related effects become more significant.

After controlling for survey related and individual specific effects, it can

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[3]These results are upon request.

be seen that in economic good times the firms tend more to nonresponse which confirms the result of Harris-Kojetin and Tucker (1999) in cases of household surveys. This effect holds when using the survey indicators as well as the official GDP growth rates. This is presumably due to the fact that in boom times the companies have less time to answer the questionnaire because of many orders. Willimack and Nichols (2010) mention that for the respondent the 'priority is given to activities required to keep the business open and growing'.[4] So, filling the questionnaire might lose priority when the business situation becomes better. This can, but not has to, be a possible source of bias.

4.2 Summary and Outlook

In this paper, we have modeled unit nonresponse behaviour in a business panel survey with the GEE framework. The analysis shows that the risk of nonresponse decreases over participation time. A panel fatigue in the sense of an increasing nonresponse behaviour with running participation time is not present. Considering the framework of Willimack et al. (2002) and the magnitudes of the estimated effects, the main reasons for different responding behaviour are among the business' characteristics since major differences were found across economic sectors and larger firms tend less to nonresponse than smaller ones. Survey characteristics, e.g. if an additional survey was sent to the firms or if the time schedule is short, seem to play a minor role in the participation process. After controlling for these

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[4]Note that these findings are based on the evaluation of large firms.

survey methodologic related effects, the willingness to participate also depends to a small extent on the economic situation. In particular, in economic good times the companies respond less often. Since the IBS focuses on evaluating the state of the business cycle, this result can be critical in terms of biases. Although the results obtained here indicate a rather low distortion, imputation methods can be used for analysing these effects by developing a consistent estimation for the missing data and recalculating the survey results. Using these methods can analyse how much the bias is and how a consistent and economically motivated estimation of the missing values can be constructed. Since the data is in a high frequency, the panel structure can be used.

| | BUSINESS SIT. | | GDP GROWTH | |
VARIABLE	COEF.	P-VALUE	COEF.	P-VALUE
Intercept	-3.813	0.000	-3.853	0.000
Participation time	-0.003	0.000	-0.003	0.000
Calendar time	0.002	0.000	0.002	0.000
Calendar time × East	-0.006	0.000	-0.006	0.000
East	1.545	0.000	1.555	0.000
Cycle indicator	0.001	0.000	0.024	0.014
Additional survey	0.005	0.743	0.003	0.855
Number of questions	0.003	0.000	0.003	0.000
Short time schedule	0.096	0.000	0.097	0.000
Working days	0.006	0.080	0.006	0.074
Vacation days	0.003	0.000	0.002	0.000
Size:				
Smallest	0.229	0.019	0.229	0.019
Small	0.112	0.215	0.113	0.212
Large	-0.134	0.117	-0.136	0.111
Largest	-0.060	0.645	-0.058	0.654
Subsector:				
Food and tobacco	0.078	0.637	0.091	0.580
Textiles, textiles products	0.108	0.508	0.095	0.564
Wood	0.332	0.039	0.298	0.063
Pulp, paper, publishing & printing	0.312	0.018	0.312	0.019
Petroleum & chemical products	0.345	0.034	0.401	0.014
Rubber & plastic products	0.601	0.000	0.604	0.000
Other non-metallic mineral products	0.429	0.002	0.402	0.003
Basic metals & fabricated metal products	0.333	0.086	0.334	0.086
Machinery & equipment	0.240	0.190	0.260	0.157
Electrical & optical equipment	0.214	0.119	0.215	0.117
Transport equipment	0.164	0.558	0.167	0.560
Furniture & manufacture n.e.c.	0.651	0.000	0.635	0.000
Motor trade	0.615	0.000	0.602	0.000
Wholesale trade	0.749	0.000	0.745	0.000
Retail trade	0.722	0.000	0.689	0.000

Table 3: Estimation results

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