Measuring nonresponse bias in a cross-country enterprise survey

Katarzyna Bankowska, Małgorzata Osiewicz, Sébastien Pérez-Duarte

European Central Bank, Kaiserstrasse 29, 60311 Frankfurt am Main, Germany.

Corresponding author: malgorzata.osiewicz@ecb.int

Nonresponse is a common issue affecting the vast majority of surveys. Efforts to convince those unwilling to participate in a survey might not necessary result in a better picture of the target population and can lead to higher, not lower, nonresponse bias.

We investigate the impact of non-response in the European Commission & European Central Bank Survey on the Access to Finance of Enterprises (SAFE), which collects evidence on the financing conditions faced by European SMEs compared with those of large firms. This survey, conducted by telephone bi-annually since 2009 by the ECB and the European Commission, provides a valuable means to search for this kind of bias, given the high heterogeneity of response propensities across countries.

The study relies on so-called "Representativity Indicators" developed within the Representativity Indicators of Survey Quality (RISQ) project, which measure the distance to a fully representative response. On this basis, we examine the quality of the SAFE Survey at different stages of the fieldwork as well as across different survey waves and countries. The RISQ methodology relies on rich sampling frame information, which is however partly limited in the case of the SAFE. We also assess the representativeness of the SAFE particular subsample created by linking the survey responses with the companies' financial information from a business register; this sub-sampling is another potential source of bias which we also attempt to quantify. Finally, we suggest possible ways how to improve monitoring of the possible nonresponse bias in the future rounds of the survey.

1. Nonresponse bias and its measurement

Nonresponse bias occurs when the survey estimates for the respondents are different from those who did not answer to the survey. While initially the nonresponse was treated as a fixed characteristic of a respondent, the more currently popular stochastic approach assumes that people have a certain probability ρ_i of participating, which varies depending on circumstances.

In this sense, the bias of the respondents' mean $\bar{y}_r$ is approximated by $\frac{\sigma_{y\rho}}{\bar{\rho}}$, where $\sigma_{y\rho}$is the population covariance between the survey variable, y, and the response propensity, ρ, and $\bar{\rho}$ is the mean propensity in the target population over sample realisations [2].

However, the relation between the response propensities and the nonresponse biases is not straightforward and higher response rates do not necessarily lead to lower bias, if higher efforts to convert the nonrespondents are effective only for particular groups, e.g. in a business survey, larger companies or enterprises encountering financial difficulties. [2] presents the absolute relative bias together with corresponding response rate for over 200 estimates from 30 different methodological studies and shows weak correlation between the two. Interestingly, most of the variation comes from the estimates within the same survey.

Dependent on the available information, various approaches are applied to analyse the nonresponse [5]. First, the survey estimates can be compared to the external sources, like administrative records. In this case, highly accurate benchmark and consistent measurement of analysed indicators between both datasets are prerequisite to the meaningful evaluation.

A second set of methods compares the survey estimates under alternative weighting schemes using additional characteristics associated with the key survey estimates or response propensities. Sensitivity of the results to different weighting would indicate the presence of nonresponse bias. On the other hand, no or insignificant differences might stem rather from lack of good predictors than absence of bias.

A third approach relies on the information from the sampling frame and observations collected during the fieldwork for the whole sample. Such data are the basis for the calculation of different statistics (e.g. sample means, proportions) separately for respondents and nonrespondents or various reasons for nonparticipation (noncontact, refusal). Additionally for longitudinal studies, past information on the initial respondents, who turned nonrespondents in the subsequent rounds, help to detect response patterns and possible causes of attrition [6]. Furthermore, the auxiliary sample information allows computing response rates by characteristics. Within the respondent set, the survey estimates can be presented for cooperative and more reluctant respondents, measured by variables like number of call attempts, early versus late respondents, provided incentives and techniques used for refusal conversion. Large variation between specific subgroups would point to the potential bias and its source. R-

indicators, which are the focus of this paper, fall also into this set of methods for nonresponse analysis.

Fourth, follow-up surveys, aimed at collecting information on the initial nonrespondents, are another possibility to investigate how distinct they are from the respondents. Such studies usually apply enhanced recruitment techniques, different survey modes, and shorter questionnaires targeted on the main variables. Apart from the drawbacks of the extra cost and the extended fieldwork, achieving high response rate in the follow-up survey is essential, which might prove a difficult objective.[1]

In this paper, we apply the third approach based on the sample information to the Survey on Access to Finance of Enterprises (SAFE), with the main focus on the R-indicators developed within the Representativity Indicators of Survey Quality (RISQ) project.

SAFE is a qualitative telephone survey conducted with the purpose of providing regular information on the financing conditions of micro, small and medium-sized enterprises (SMEs). A sample of large firms (250 employees or more) is also included in order to be able to compare developments for SMEs with those for large firms. A subset of the survey is run by the ECB every six months to assess the latest developments of the financing conditions of firms in the euro area countries. A more comprehensive version of the survey with an extended questionnaire is run every two years, in cooperation with the European Commission. The survey is conducted by an external survey company. The sample is a quota sample stratified by country and size and the enterprises are drawn from the business register Dun & Bradstreet.

Given the restricted length of phone interview and respondent's difficulties in answering questions related to quantitative accounting elements, to obtain balance sheet information of the interviewed companies, the survey data are matched with the quantitative financial information from the Bureau van Dijk's Amadeus database.

The objective of this study is to examine the representativity of the SAFE sample, as well as the subsample containing the matched financial information. This paper gives first an overview of the nonresponse in SAFE. In the following sections, we describe briefly the methodology of

[1] Additional data collection can also take the form of randomised nonresponse experiments, where different design features (e.g. "warm-up" questions, mode) are assigned to different random subsamples. The results and the response rates of the treatment groups are then compared and effective design identified, although it might be challenging to find one treatment which performs well in terms of reducing nonresponse bias, not only for a particular group, but for the full sample [5].

various types of R-indicators and present the implementation of the indicators in SAFE and the matched dataset of SAFE and Amadeus. In final section, we conclude and give the recommendation for fieldwork monitoring.

2. Nonresponse in the Survey on Access to Finance of Enterprises (SAFE)

A common problem across nearly all types of surveys is low response rates, which in fact have dropped substantially over the last decades (see [6], p. 12-30]. A low response rate is also a concern for SAFE. The overall response rate reached around 14% in the last survey rounds[2], below those of other business surveys run by central banks. While these other surveys are not comparable, given the differences in how they are conducted, in absolute terms the response rates for the SAFE can nevertheless be objectively deemed low. As this may be a source of uncertainty about the quality of the results, in this paper we apply R-indicators to analyse from several angles possible nonresponse bias and its origin.

In the first step, we present the outcome rates for SAFE by main characteristics of enterprises: country of residence, size, sector and participation in the panel. Those results will be later cross-checked with the findings coming from the R-indicators. We focus on the three latest survey rounds (8^{th} to 10^{th}) as detailed information on the full sample was not available in the earlier rounds. When computing response and cooperation rates, break-off interviews are treated as nonresponse. In case of unknown eligibility, the proportion of cases of unknown eligibility that are eligible is estimated[3] and increased from 0.6 in 8^{th} survey round to 0.8 in the 10^{th} round, which is rather conservative, since the higher this proportion, the lower the response rate. While contact, cooperation and response rates vary considerably across countries, neither companies' sector nor size class have a large impact on the response rates (small firms have a slightly higher propensity to participate, while construction firms have a lower one; see Figure 1). The largest divergence shows between panel and non-panel enterprises with relatively high response

[2] Response rate 3, following the definition of outcome rates advocated by AAPOR (American Association for Public Opinion Research). Since the original AAPOR definitions refer to household surveys, they were adapted to the features of a business survey.

[3] Following the definitions:

- response rate 3: I/((I+P) + (R+NC+O)+ e*U),
- cooperation rate 3: I/(I+P+R),
- refusal rate 2: R/((I+P)+(R+NC+O) + e*U),
- contact rate 2: ((I+P)+R+O) / ((I+P)+R+O+NC+ e*U),
- e: (I+P+R+NC+O)/(I+P+R+NC+O+NE),

where I – Interview, P – Partial interview, R – Refusal, NC – Non-contact, O – Other contact (non-refusals), U – Unknown if firm, e- the estimated proportion of cases of unknown eligibility that are eligible.

rate of 40% for panellist in 8th survey round, either through a positive image of the survey acquired through previous participation or a higher propensity to participate.

Figure 1. Outcome rates for SAFE from 8th to 10th survey round by country.

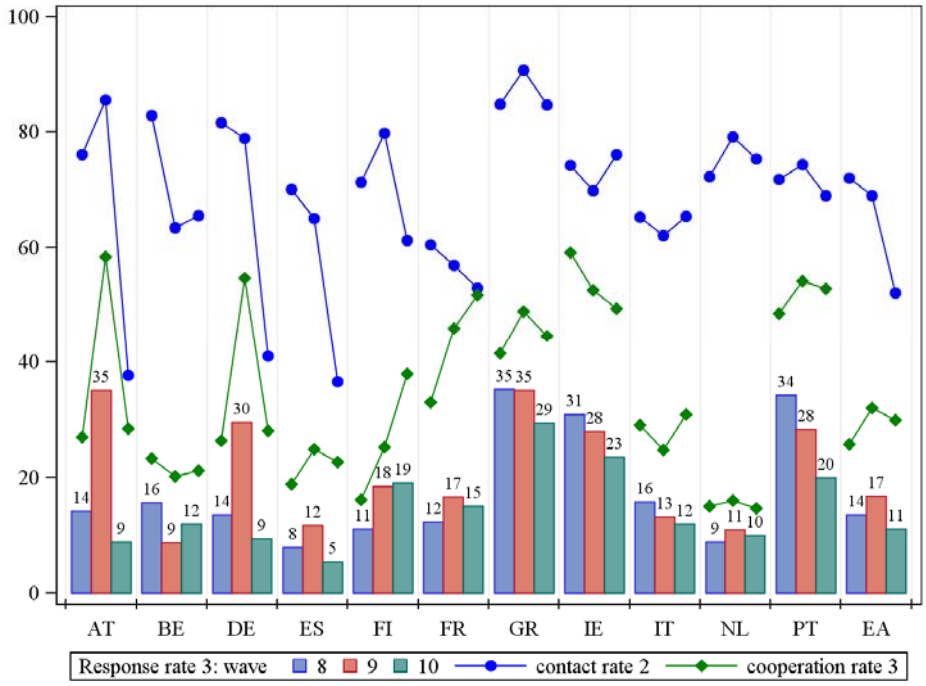
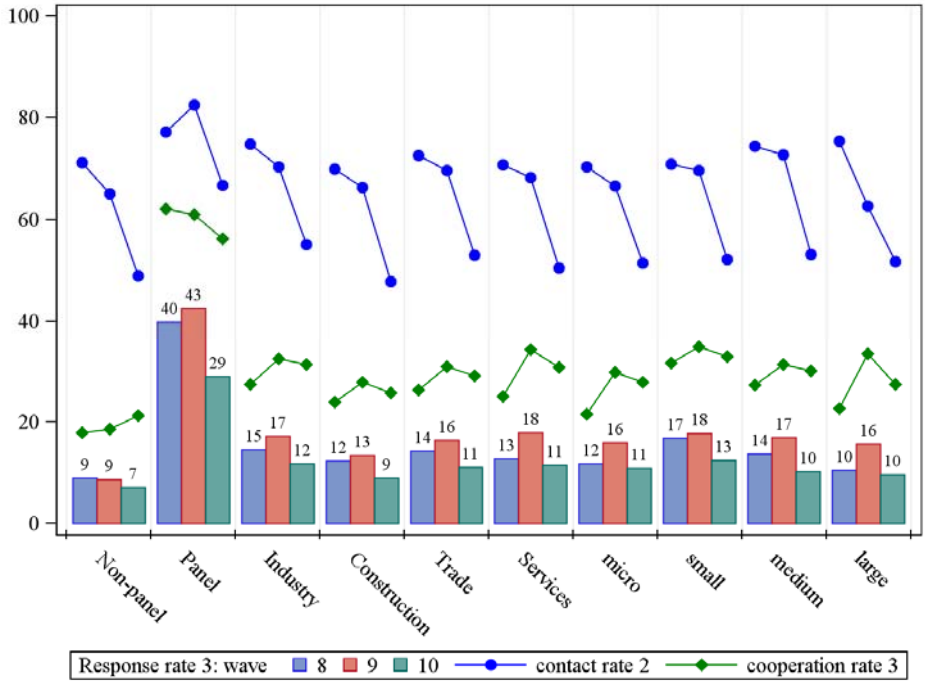


Figure 2. Outcome rates for SAFE from 8th to 10th survey round by panel dummy, sector and size.



Country variation can stem from many factors. First, cultural differences play a role. In some countries, the respondents strongly refuse to participate, asking to be excluded from any future surveys conducted by the survey company, while in other countries, where the refusals are

softer, good interviewers can more easily convince initial nonrespondents to eventually take part in the study. Second, the quality of the sampling frame differs across countries. The low quality of the enterprises' contact information, number of employees or sector will result in unsuccessful phone calls (in case of wrong company's number) or necessity to exclude a respondent after the screener questions (in case of SAFE, if the firm is non-profit, has no employees other than the owner or belongs to a sector which is out of the scope of the SAFE). Third, the situation in the local offices of the survey company, such as the experience and training of the interviewers, work load at the time of conducting the survey can also have an impact on the response rate. In case of SAFE, additional factor which can explain the divergences is different CATI system used by the survey company in Germany and Austria and it is apparent that the outcome codes are not fully harmonised with offices in other locations.

3. R-indicators as a measure of representativity

The concept of 'representativeness' does not have single clear interpretation. [4] reviews the statistical and other scientific literature and divides the meaning of term "representative" into no less that nine different groups, varying from "general acclaim for data", through "miniature of the population" to "representative sampling as permitting good estimation".

Representativity indicators (R-indicators) are based on definition linked to the mechanism of Missing Completely at Random (MCAR) and individual response propensities. Following [7], "response is called representative with respect to [the vector of auxiliary variables] X when the response propensities of all subpopulations formed by the auxiliary variables are constant and equal to the overall response rate", in other words, "when the respondents form a random subsample of the survey sample". In this sense, the R-indicators attempt to capture the overall impact of the nonresponse for the whole survey, and not only at the level of a particular estimate.

Although it is not the point of this paper to describe in details the theoretical properties of the R-indicators, which is much better done in [11] or in [8], we present their definition and main features.

The R-indicator is based on the standard deviation of the response propensities transformed to lie between 0 and 1, where 1 is representative response:

$$R = 1 - 2S(\rho) = 1 - 2\sqrt{\frac{1}{N-1}\sum_{i=1}^{n} d_i(\rho_i - \bar{\rho})^2},$$

where d_i are the design weights, $\bar{\rho} = \frac{1}{N}\sum_{i=1}^{n} d_i\rho_i$ is the weighted sample mean of the estimated response propensities and *N* is the size of the population.

It can be shown that the lower bound of the R-indicator (see [8], p.104) depends on the response rate: $R \geq 1 - 2\sqrt{\bar{\rho}(1-\bar{\rho})}$. Notably, it reaches its minimum of 0 for response rate of 0.5, i.e. when the individual response propensities can have largest variation, while it increases when the response rates decreases from 0.5 to 0.

The decomposition of the variance $S^2(\rho)$ into between- and within components of the response propensities for the sample subgroups is the foundation of the partial R-indicators at variable level. The unconditional partial R-indicator corresponds to the between subgroup variance, while the within variances are the basis for the conditional partial indicators [7]. Those indicators can be further decomposed into the category level R-indicators showing the contributions to the variation of the respective categories [3].

	Unconditional	**Conditional**
$S^2(\rho) =$	$S^2_{between}(\rho)$	$S^2_{within}(\rho)$
Variable level	$P_U(X_k) = \sqrt{\frac{1}{N}\sum_{h=1}^{H} n_h(\bar{\rho}_h - \bar{\rho})^2}$	$P_C(X_k) = \sqrt{\frac{1}{N}\sum_{l=1}^{L}\sum_{i\in U_l} d_i(\rho_i - \bar{\rho})^2}$
Category level	$P_U(X_k, h) = \sqrt{\frac{n_h}{N}}(\bar{\rho}_h - \bar{\rho})$	$P_C(X_k, h) = \sqrt{\frac{1}{N}\sum_{l=1}^{L}\sum_{i\in U_l} d_i\Delta_{h,i}(\rho_i - \bar{\rho}_l)^2}$
Notation	X_k is a categorical variable with *H* categories and it is a component of the vector $\underline{X}$. $n_h = \sum_{i=1}^{n} d_i\Delta_{h,i}$ is the weighted sample size in the category *h*, where $\Delta_{h,i}$ is a 0-1 dummy variable for sample unit *i* being a member of stratum *h* . U_l is a cell in the cross-classification of all model variables except X_k	

Maximal relative absolute relative bias, in the worst case scenario, if the nonresponse correlates maximally with the variable of interest is $B_m(X) = \frac{1-R(\rho)}{2\bar{\rho}} \leq 1 - \bar{\rho}$ and it can be shown that it cannot be larger than the nonresponse rate (see [9]).

4. R-indicators for SAFE survey

For the computation of R-indicators and associated statistics, we used the SAS code available at the website of the RISQ project[4] (see also [3] for the methods of bias adjustment and computation of confidence intervals of the R-indicators).

The main requirement for the computation of the R-indicators is the availability of the auxiliary information from the sampling frame. The microdata for the whole sample of SAFE were provided only from 7th survey round, although not fully harmonised yet, and contain detailed outcome codes of a phone call (interview, refusal, answering machine, etc.), size class and sector from business register Dun & Bradstreet (D&B) and a dummy for panel firms (only from 8th survey round onwards). We also have the date of the last attempt or contact, which in case of respondent is the time of the interview.

Although the methods to estimate representativity were not designed for quota samples, we will neglect this issue in this paper and assume that the respondents were obtained through a simple random sample. We will consider that every firm for which a contact was attempted is to be included in the sample as a non-respondent.

All R-indicators were computed using four above mentioned variables, i.e. country (11 euro area countries), size class (micro, small, medium and large), sector (industry, construction, trade and services) and panel dummy.

4.1. R-indicators across survey rounds (8 to 10)

We start the examination from the R-indicators for each survey round looking at the overall response and contact rates. It would be possible to split the response process into successive subprocesses of contact, cooperation and final response, as it was done in [7]. However, being unsure to which extent the outcome codes are harmonised among countries, we limit this initial analysis to two processes mentioned.

[4] http://www.risq-project.eu/tools.html

Table 1. R-indicators and other associated information for the survey rounds 8 to 10.

Round	8	9	10	8	9	10
	Response			Contact		
Total sample	91528	66026	80219	91528	66026	80219
Response rate 3 / contact 2	13.5%	16.8%	11.1%	72.1%	68.9%	52.1%
R-indicator	0.841	0.717	0.849	0.805	0.783	0.697
Standard error	0.003	0.006	0.003	0.004	0.005	0.004
Ave propensity	0.082	0.114	0.094	0.658	0.665	0.518
Maximum bias	0.973	1.245	0.807	0.148	0.164	0.293
Lower bound for R	0.451	0.365	0.417	0.051	0.056	0.001

Interestingly, the R-indicator for overall response is the lowest for the 9th round, although the highest response rate was achieved in that round (see Table 1). Notably, it was the time when longer questionnaire was used. We cannot draw conclusion from this one observation, but it would be recommended to monitor in the future the development of the nonresponse bias in the rounds with the extended questionnaire.

Looking at the R-indicator corresponding to contact propensities, the 10th survey round scores the worst. It was already visible from the investigations of outcome rates, where the contact rate dropped dramatically from round 9 to 10, particularly in three countries: Austria, Germany and Spain[5]. In this case, low contact rate is also associated with higher bias – the large negative unconditional values for R-indicator point to the underrepresentation of those three countries in the pool of contacted enterprises, while the Netherlands and Italy with high positive unconditional values are in comparison overrepresented (see Table 3).

More generally, with respect to contact the country variation contributes the most to the loss of representativeness in all examined survey rounds. The unconditional and conditional partial R-indicators for the country variable are higher for the contact than for the response. It seems that enterprises in some countries are more difficult to contact than in other regions, which points out also to the issues with the quality of the sampling frame. For SAFE, enterprises are all sampled from Dun & Bradstreet; however, the availability and accuracy of the contact information is not homogenous, given that the underlying sources of information differ by country. Consequently, it would be recommended to increase the efforts in the improvement of the sampling frame.

[5] Investigating the outcome codes at more detailed level, it seems that it was caused by the problems with dialling system ('timeout has been reached, causing the dialler to hang up the call' was the cause of unsuccessful contacts for disproportionately many call attempts).

If we turn to the overall response, the impact of the country variation remains, but unsurprisingly, the fact whether the enterprise belongs to the panel or not plays the biggest role. This is consistent with the earlier finding about much higher response propensities of the panel firms.

4.2. R-indicators during the SAFE fieldwork

The R-indicators can be implemented as a tool for monitoring the representativeness during the data collection. They can be computed for different amount of efforts, e.g. number of attempts, level of interviewer's experience. In SAFE such fieldwork information is limited and we analyse the development of the R-indicators during fieldwork progress.

The SAFE is conducted usually within one month, however, the start and end of the fieldwork can slightly vary by country. To account for these differences, we divide fieldwork into four periods based on the quartiles of the total number of fieldwork days, calculated separately for each country. The results for the 8th round are presented in Table 2. For the first fieldwork quartile, which corresponds to approximately the first week of the data collection, the representativity is the highest with R-indicator reaching 0.92. It drops slightly in the second quartile to 0.87 and remains broadly stable till the end of the fieldwork. In this case, the split of the sample into the enterprises which are part of the panel and those participating for the first time plays the major role as indicated by increasing partial R-indicator as the fieldwork progresses (see Table 4).

Table 2. R-indicators for the response and other associated information for each quartile of the fieldwork (8th survey round)

	Up to 1st quartile	Up to 2nd quartile	Up to 3rd quartile	Full fieldwork
Total sample	91528	91528	91528	91528
R-indicator	0.917	0.865	0.845	0.841
Standard error	0.003	0.003	0.003	0.003
Ave response propensity	0.023	0.048	0.069	0.082
Maximum bias	1.784	1.425	1.129	0.973
Lower bound for R	0.698	0.574	0.494	0.451

5. R-indicators for SAFE data matched with Amadeus database

In this section, first we describe briefly the matching methodology of the SAFE dataset with the Bureau van Dijk's Amadeus database and comment on the quality of the matching. Second, with the dataset, containing both qualitative and quantitative firm-level information, we analyse the R-indicators looking at the availability of the financial information among respondents.

To link the companies from SAFE and Amadeus the information on tax identification number, company name, street, postcode, city and country are used. In the 8th round, 80% of SAFE respondent were successfully matched with Amadeus business register. The quality of matching varies substantially between countries, with success rates over 90% in Belgium, Spain, France and the Netherlands and the lowest in Greece of 43%. There is also a significant difference between the size classes, with the large companies being successfully matched in 94% of cases, whereas the micro firms only in 64%. The difference on the sector level is much less pronounced.

Being in Amadeus is not enough; a record may have missing financial information. For that reason, we examine separately the representativeness of the SAFE subsamples containing the respondents with the available information on loans, value added and turnover in 8th survey round.

Table 3. R-indicators and other associated information for the availability of information on loans, value added and turnover (8th survey round, respondents)

	Loans	Value added	Turnover
Total sample	7510	7510	7510
R-indicator*	0.744	0.805	0.741
Standard error	0.003	0.002	0.003
Ave propensity	0.605	0.403	0.539
Maximum bias	0.211	0.242	0.240
Lower bound for R	0.022	0.019	0.003

* Due to smaller sample size R-indicator adjusted for bias is used as in [3].

The R-indicators were computed using the same auxiliary variables as in earlier analysis (i.e. country, size, sector and panel dummy), and amount to 0.81 for the value added and are a bit lower for loans and turnover (0.74). In all three cases, the lack of representativity, measured by both partial conditional and unconditional R-indicators, comes mainly from the variables country and size. Estimated negative values for the category level partial indicators, suggest that the enterprises in the Netherlands, Germany and to a lesser extent Greece are underrepresented in the set of companies with available financial information. Looking at value added and turnover this applies also to Belgium and Ireland. On the other hand, France and Spain are strongly overrepresented with respect to all the three variables considered.

Unlike in the analysis of the whole SAFE sample, the size class breakdown contributes to the loss of representativity in the dataset matched with quantitative financial variables. As expected, micro companies, for which financial information are scarce, are strongly

underrepresented also in the matched SAFE subsample (see Table 5). The findings are also reflected in the overall matching rates at the enterprise level, as mentioned above.

It is also worth noting that in the 8th round the representativity for the SAFE respondents among the whole sample is better than the representativity of respondents with financial information (R-indicator at the level of 0.84 for the SAFE sample in comparison to 0.81 for value added and 0.74 for turnover and loans). On the other hand, given the difference in the response rate (which in case of Amadeus subsample is the share of available company information), the risk of bias is much lower for the Amadeus subsample and amounts to maximum 0.24 standard deviation of a survey estimate of interest, while for SAFE sample it can reach maximum of 0.97.

6. Conclusions

In this paper we present R-indicators for SAFE and show that the level of representativity is comparable to other surveys (e.g. see [7]). We found that for the SAFE sample, the country variation contributes mostly to the loss in representativity, while for the Amadeus subsample also size class plays a role with the evident underrepresentation of micro firms.

Based on these findings, we make the following recommendations: i) increase efforts to enhance the quality of the sample contact information, ii) fully harmonise the use of the outcome codes across countries and interviewers, and iii) collect more detailed information from the fieldwork useful for the monitoring of the data collection, i.e. outcome codes for each attempt and possibly interviewers' performance and experience.

As from the next survey round, a new survey company will be in charge of the fieldwork. Given that this new supplier will conduct interviews from one central call centre, as opposed to having local agencies in each region, we will have the opportunity to disentangle the country variation from the differences in the organisation of local offices. Since the introduction of the online questionnaire is envisaged as from the next survey round in September 2014, it will be important to investigate and monitor the representativity of different survey modes.

This paper could be extended in three directions. First, the representativity of the sample frame can be assessed with respect to the official statistics on the enterprises' population. Second, the sensitivity of the survey results can be tested using different weighting schemes. Finally, as mentioned before, the analysis presented in this paper can be extended using newly available information from the fieldwork and splitting response process into several subprocesses (like contact, cooperation and response) to identify the main causes of potential nonresponse bias.

7. References

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8. Annex

Table 3. Unconditional and conditional partial R-indicators for contact and response in 8 to 10 survey round.

	Unconditional						*Conditional*					
Round	**8**	**9**	**10**	**8**	**9**	**10**	**8**	**9**	**10**	**8**	**9**	**10**
Variable level	**response**			**contact**			**response**			**contact**		
country	0.001	0.006	0.001	0.008	0.007	0.021	0.000	0.001	0.001	0.009	0.006	0.020
size	0.001	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.001	0.002	0.001
sector	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
panel	0.007	0.016	0.005	0.000	0.004	0.005	0.005	0.015	0.005	0.000	0.003	0.003
Category level												
AT	-0.004	0.004	-0.003	0.021	0.030	-0.027	0.002	0.001	0.003	0.022	0.025	0.027
BE	-0.005	-0.012	-0.001	0.022	-0.026	0.026	0.004	0.009	0.003	0.022	0.018	0.026
DE	-0.002	0.072	-0.004	0.053	0.018	-0.053	0.003	0.027	0.006	0.050	0.010	0.062
ES	-0.010	-0.012	-0.015	-0.049	-0.037	-0.051	0.006	0.008	0.013	0.055	0.035	0.054
FI	0.001	0.005	0.010	0.006	0.021	0.022	0.002	0.003	0.011	0.007	0.025	0.022
FR	0.007	-0.003	0.009	-0.026	0.020	0.030	0.007	0.003	0.009	0.037	0.028	0.023
GR	0.003	0.008	0.012	0.017	0.013	0.014	0.001	0.006	0.012	0.017	0.013	0.013
IE	0.014	0.003	0.009	-0.008	-0.002	0.016	0.006	0.001	0.004	0.010	0.002	0.012
IT	0.010	-0.008	0.003	-0.012	-0.033	0.075	0.003	0.003	0.006	0.030	0.026	0.061
NL	-0.005	-0.011	-0.001	-0.013	0.035	0.083	0.005	0.010	0.003	0.016	0.042	0.081
PT	0.016	0.019	0.012	0.006	0.009	0.013	0.008	0.009	0.009	0.003	0.007	0.007
micro	-0.022	-0.006	-0.008	-0.008	-0.057	-0.022	0.019	0.002	0.005	0.023	0.042	0.028
small	0.014	0.006	0.005	-0.008	-0.001	0.000	0.010	0.005	0.004	0.013	0.007	0.003
medium	0.001	-0.002	0.000	0.006	0.012	0.003	0.001	0.002	0.000	0.008	0.011	0.005
large	-0.001	0.001	-0.001	0.000	-0.002	0.002	0.001	0.001	0.001	0.002	0.003	0.002
industry	0.007	0.003	0.004	0.008	0.011	0.012	0.003	0.004	0.003	0.004	0.008	0.007
construction	-0.003	-0.011	-0.008	-0.013	-0.019	-0.021	0.001	0.009	0.006	0.010	0.014	0.015
trade	0.001	-0.002	0.000	0.007	-0.001	0.004	0.001	0.002	0.001	0.007	0.006	0.005
services	-0.004	0.003	0.000	-0.004	-0.001	-0.005	0.002	0.001	0.001	0.001	0.001	0.001
non-panel	-0.028	-0.052	-0.031	-0.006	-0.025	-0.029	0.029	0.069	0.029	0.006	0.031	0.022
panel	0.079	0.117	0.067	0.018	0.058	0.062	0.065	0.099	0.063	0.015	0.049	0.049

Table 4. Unconditional and conditional partial R-indicators for response during fieldwork progress in round 8.

	Unconditional				*Conditional*			
Variable level	**Up to 1st quartile**	**Up to 2nd quartile**	**Up to 3rd quartile**	**Full fieldwork**	**Up to 1st quartile**	**Up to 2nd quartile**	**Up to 3rd quartile**	**Full fieldwork**
country	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000
size	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000
sector	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
panel	0.002	0.005	0.007	0.007	0.002	0.004	0.005	0.005
Category level								
AT	-0.001	-0.003	-0.004	-0.004	0.000	0.003	0.003	0.002
BE	-0.002	-0.002	-0.004	-0.005	0.002	0.002	0.003	0.004
DE	0.000	-0.005	-0.007	-0.002	0.001	0.008	0.009	0.003
ES	-0.003	-0.005	-0.008	-0.010	0.000	0.002	0.004	0.006
FI	-0.001	0.000	0.002	0.001	0.001	0.001	0.002	0.002
FR	0.002	0.001	0.005	0.007	0.004	0.002	0.005	0.007
GR	0.001	0.002	0.004	0.003	0.001	0.000	0.001	0.001
IE	0.004	0.012	0.014	0.014	0.000	0.006	0.007	0.006
IT	0.000	0.008	0.009	0.010	0.005	0.003	0.003	0.003
NL	-0.001	-0.004	-0.005	-0.005	0.002	0.004	0.005	0.005
PT	0.010	0.013	0.015	0.016	0.009	0.008	0.008	0.008
micro	-0.005	-0.012	-0.018	-0.022	0.002	0.010	0.016	0.019
small	0.004	0.009	0.014	0.014	0.003	0.007	0.010	0.010
medium	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.001
large	0.000	0.000	-0.001	-0.001	0.000	0.000	0.001	0.001
industry	0.002	0.005	0.006	0.007	0.001	0.003	0.003	0.003
construction	0.000	-0.002	-0.003	-0.003	0.001	0.000	0.001	0.001
trade	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001
services	-0.001	-0.003	-0.004	-0.004	0.001	0.001	0.001	0.002
non-panel	-0.014	-0.023	-0.027	-0.028	0.016	0.026	0.029	0.029
panel	0.038	0.065	0.076	0.079	0.036	0.057	0.064	0.065

Table 5. Unconditional and conditional partial R-indicators for SAFE respondents matched with Amadeus database (8th survey round).

	Unconditional			Conditional		
Variable level	Loans	Value added	Turnover	Loans	Value added	Turnover
country	0.003	0.005	0.004	0.002	0.003	0.004
size	0.002	0.002	0.003	0.002	0.003	0.002
sector	0.000	0.001	0.001	0.000	0.000	0.000
panel	0.000	0.000	0.000	0.000	0.000	0.000
Category level						
AT	0.000	-0.008	-0.004	0.001	0.007	0.004
BE	0.012	-0.015	-0.018	0.016	0.010	0.015
DE	-0.024	-0.020	-0.015	0.028	0.021	0.019
ES	0.014	0.027	0.018	0.015	0.027	0.018
FI	0.005	0.001	0.007	0.005	0.002	0.008
FR	0.011	0.025	0.038	0.007	0.016	0.042
GR	-0.006	-0.012	-0.004	0.005	0.008	0.004
IE	0.002	-0.015	-0.022	0.002	0.010	0.016
IT	0.006	0.033	0.017	0.005	0.019	0.008
NL	-0.037	-0.029	-0.032	0.030	0.018	0.024
PT	0.006	0.023	0.013	0.006	0.023	0.014
micro	-0.045	-0.048	-0.052	0.043	0.054	0.049
small	0.006	-0.001	0.003	0.007	0.008	0.008
medium	0.006	0.009	0.008	0.006	0.007	0.006
large	0.002	0.004	0.004	0.002	0.003	0.003
industry	0.013	0.017	0.016	0.007	0.005	0.007
construction	0.002	0.001	0.002	0.001	0.001	0.001
trade	-0.013	-0.016	-0.015	0.006	0.001	0.003
services	-0.003	-0.006	-0.006	0.001	0.003	0.002
non-panel	-0.001	0.001	0.004	0.000	0.000	0.003
panel	0.001	-0.001	-0.005	0.000	0.000	0.003