

***Mode effects in a basic question
approach for the Dutch LFS***

Discussion paper 07003

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Explanation of symbols

.	= data not available
*	= provisional figure
x	= publication prohibited (confidential figure)
?	= nil or less than half of unit concerned
0 (0,0)	= less than half of unit concerned
?	= (between two figures) inclusive
blank	= not applicable
2005?2006	= 2005 to 2006 inclusive
2005/2006	= average of 2005 up to and including 2006
2005/'06	= crop year, financial year, school year etc. beginning in 2005 and ending in 2006
2003/'04?2005/'06	= crop year, financial year, etc. 2003/'04 to 2005/'06 inclusive

Due to rounding, some totals may not correspond with the sum of the separate figures.

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MODE EFFECTS IN A BASIC QUESTION APPROACH FOR THE DUTCH LFS

From July to October 2005, a sample of non-respondents to the Dutch Labour Force Survey (LFS) was once more approached with strongly condensed questionnaires containing only a small number of emphasic questions. The main goal of this so-called Basic Question Approach (BQA) is to gain insight in possible differences between respondents and non-respondents with respect to the most important variables of the survey.

Besides the condensed questionnaire, the data collection mode in the BQA was also different from the mode in the regular LFS. The questionnaires were designed for Computer Assisted Telephone Interviewing (CATI) and also web and paper versions were developed. Non-respondents having a listed land-line phone number were assigned to CATI, while all other non-respondents received a prenotification letter with a paper questionnaire attached and a login to the web questionnaire.

These differences in design complicate a direct comparison of respondents and original non-respondents in the LFS. Possible differences could also be caused by a change of questionnaire and interview mode, i.e. mode effects. Therefore, a fresh control sample was approached with basic questions to determine whether the design of the BQA induced mode effects.

In this paper, we analyse this control sample. We restrict the analysis to the CATI-group because the response to the Web/paper variant was too low. We find no significant difference between the response in the basic question approach and the LFS.

Key words: non-response, follow-up

1. Introduction

That non-response possibly leads to biased estimators is a well-known fact. But how can we assess whether this is indeed the case? We will need to know more about the non-respondents. Unfortunately, non-respondents are non-respondents

because they did not provide the information we asked them for. This seems like a vicious circle. Fortunately there are two solutions to this problem.

The first possibility is to retrieve information on non-respondents from other sources. Statistics Netherlands has at its disposition a large amount of administrative data. The variables in these sources vary from demographic information (age, gender, town of residence) to social information (composition of the household, average house value, education) and economic information (income, employment). Auxiliary information can be employed to explain differences in response behavior. For obvious reasons the answers to survey questions can in most cases not be found in administrative data.

Models that attempt to adjust for non-response bias have to rely on assumptions about the relation between variables. One can specify the relation between the auxiliary information and the survey questions, or the auxiliary information and the response behaviour, or the auxiliary information and both survey questions and response behaviour. The most common assumption is that the non-respondents' data are Missing At Random (MAR) given the auxiliary information. To test this assumption, however, again we need information about non-respondents.

Another way to get information about non-respondents, is by simply asking them for it. Obviously, this may require a lot of effort. Hansen and Hurvitz (1946) proposed to investigate non-response in mail surveys by taking a sample of non-respondents and trying to obtain the required information by means of a face-to-face interview. This so-called call back approach (CBA) ¹ consists of taking a sample of the non-respondents and to follow up the selected initial non-respondents. In the follow up one may choose to use a different data collection mode, specially trained interviewers, an extended fieldwork period, or incentives for the respondents-to-be. If the information collected in the second phase is representative for all non-respondents, i.e. if there is no non-response to the second sample or the non-response is MCAR, then an indication of the difference between respondents and non-respondents can be obtained.

The call back approach is a rather expensive method to obtain information. Also, sampling and following up non-respondents will considerably lengthen the

¹The CBA is often also referred to as a follow-up of non-respondents.

fieldwork period. An alternative to the call back approach is the basic question approach (BQA). This method can be applied when due to time or budget constraints the call back approach is not an option.

The basic question approach assumes that many survey questionnaires are composed around a few basic questions. With the answers to these questions the most important conclusion of the survey can be formulated. The procedure was first proposed by Kersten and Bethlehem (1984), who observed that persons who refused to participate in a survey often could be persuaded to answer just a few basic questions. The main goal of the basic question approach is to gain insight in possible differences between respondents and non-respondents with respect to the most important variables of the survey; represented by the *basic questions*. If such differences are detected, the approach also provides information for adjusting estimates for other variables. For application of the BQA see for instance Van den Brakel and Renssen (1998) and Voogt (2004).

We applied the BQA to non-respondents of the Dutch Labour Force Survey (LFS). Samples out of the non-response of the months July to October 2005 were once more approached with strongly condensed questionnaires. The questionnaires were designed for Computer Assisted Telephone Interviewing (CATI) and also web and paper versions were developed. Non-respondents that have a listed land-line phone number were assigned to CATI, while all other non-respondents received a prenotification letter with a paper questionnaire attached and a login to the web questionnaire. The total sample consisted of 1000 households. The questionnaire contained only those questions that are relevant for the derivation of the employment status of a person.

The BQA pilot had two objectives. First, we wanted to investigate whether we can detect differences between LFS respondents and LFS non-respondents using the BQA response. Second, if indeed we can detect such differences, we want to investigate if we can incorporate the BQA response in the non-response adjustment of the LFS. However, by changing both the questionnaire and the interview modes, the LFS is face-to-face, we face the risk of errors other than non-response error. For an introduction to survey errors see Groves (1989) and Biemer and Lyberg (2003). A change of wording and context as well as a change in mode may seriously affect the answers, and, hence, statistics that are based

on the survey. When such mode effects are imminent, we cannot draw any conclusions about non-response error, because we cannot decompose the total survey error. Therefore, we took a fresh sample out of the population that serves as a control group. Since the control group consists of households that are not contacted before, this group can be used to assess mode effects.

In this paper we discuss the mode effects in the BQA pilot by comparing the composition of the BQA response in the control group to the LFS response. We want to answer the research question whether mode effects are present in the BQA for the LFS. By linking auxiliary information to both samples we can directly assess non-response error with respect to the auxiliary variables. From the analysis of non-response error we can define strata in which households have a homogeneous response behaviour with respect to the auxiliary variables. Within those strata we can investigate the mode effects by considering the answers to the survey questions. We can still not fully disentangle non-response error from mode effects, however. Within strata households may have a BQA response behaviour that is different from the LFS response behaviour when it comes to the survey topics. However, we settle for conclusions about the sum of mode effects and remaining non-response error. In practice we will always have to deal with them simultaneously as well.

First, section 2 gives a more detailed account of the basic question approach. In section 3, the design of our BQA pilot is outlined. In section 4, we compare the BQA answers in the control group to the answers to the regular LFS questions, and investigate the mode effects. Finally, section 5 discusses the results and concludes.

2. The basic question approach

The basic question approach assumes surveys contain a few key questions that are the input to many statistics. The approach was first proposed by Kersten and Bethlehem (1984), who observed that persons who refused to participate in a survey often could be persuaded to answer just a few questions, which they called basic questions. The main goal of the basic question approach is to gain insight in possible differences between respondents and non-respondents with

respect to the most important variables of the survey. If such differences are detected, the approach may provide a tool for the adjustment of other variables as well.

One implementation of the basic question approach is to let the interviewers ask the basic questions immediately after they received a refusal for the main questionnaire. This may lead to higher non-response rates for the main questionnaire, as Van den Brakel and Renssen (1998) and Van Goor and van Goor (2003) found. Interviewers may switch to the BQA too soon, thereby shortening the doorstep interaction and putting less effort in conversion of refusers. Therefore it is better (but also more expensive) to re-approach the refusers after a short while with different interviewers.

Considerable insight into the characteristics of non-respondents can be obtained in situations where especially the name of the survey causes non-response. This may occur when people think the survey does not apply to them, e.g. if they do not intend to move (in a housing demand survey), they do not have a job (in a labour force survey), or they do not visit a doctor (in a health survey).

Lynn (2003) proposed a method called PEDAKSI that is similar to BQA. PEDAKSI stands for Pre-Emptive Doorstep Administration of Key Survey Items. The difference with BQA is the number of questions. BQA aims at two or three questions while PEDAKSI contains a larger number of questions.

Kersten and Bethlehem (1984) give some examples of basic questions that have been used in surveys by Statistics Netherlands, see Table 1.

Voogt (2004) has applied both the call back and the basic question approach in his research on non-response bias in election research. There were two basic questions in his survey:

- Did you vote in the parliamentary election on Wednesday May 6, 1998?
- Are you interested in politics, fairly interested or not interested?

In the first wave of the survey, people were contacted by telephone if a telephone number was available. If not, they were sent a paper questionnaire by mail. The BQA was applied in a separate follow-up. All refusers were offered the

Table 1. Basic questions in surveys by Statistics Netherlands.

<i>Survey</i>	<i>Basic question</i>
Housing Demand Survey	Do you intend to move within two years?
Labour Force Survey	How many people in this household have a paid job?
Holiday Survey	Have you been on holiday during the last 12 months?
Family Planning Survey	Taking into account your present circumstances, and your expectations of the future, how many children do you think to get from this moment on?

possibility to answer just the two basic questions (by telephone or by paper questionnaire). The CBA was applied to those who refused to answer the basic questions. This time the refusers were visited at home by interviewers. The results of the fieldwork are summarised in Table 2.

Table 2. Response in the election research by Voogt (2004).

<i>Result</i>	<i>Cases</i>	<i>Percentage</i>
Response in first wave	508	51.1%
Response in basic question approach	196	19.7%
Response in call back approach	224	22.5%
Final non-response	67	6.7%
Total	995	100.0%

One conclusion from table 2 is that the situation need not be hopeless if the response is low in the first wave. With additional measures response rates can be increased substantially. This conclusion is in line with Stoop (2005).

Voogt (2004) also concludes that the response in the BQA is not representative for the whole of non-response. Persistent non-respondents are different from converted non-respondents. However, he concludes that the non-response bias of survey estimates decreased by the addition of the BQA response. These results led us to believe that the BQA may be a useful tool to validate and adjust LFS

estimates.

3. The basic question approach in the Dutch LFS

3.1. The sample design of the BQA pilot

The basic question approach has been applied in the pilot to two groups. The first group is the control group. This fresh sample consists of 1000 persons. The second group is a sample of non-respondents of the regular LFS and consists of 853 persons. The design and questionnaire were exactly the same for both groups. In this paper we focus on the control group. The sample of non-respondents that received the BQA at the same time will be the topic of a forthcoming paper.

The sample of the control group follows to a large extent the design of the LFS. The LFS is a two-stage sample with municipalities as primary sampling units and addresses as secondary sampling units. Every household on a sampled address, up to a maximum of 8 households, is asked to co-operate in the survey. Within each household, all persons of 15 years and older are eligible. In the BQA a third stage is added to the design, a random selection procedure was applied to select one single person within the address. Only this person has to answer the basic questions, namely the person that is the next to have its birthday. We decided to ask only one person in the BQA because we feared that otherwise the main argument of the BQA, low response burden, would not hold anymore. If we would ask the whole household, then we expected this would seriously affect the response rate in the BQA. The within-household respondent selection method is described in §3.3. We have to remark that we select a single person also in case there are multiple households living at the address.

The most important variable in the LFS is the employment situation. Since different persons may have different perceptions of employment, we cannot simply ask them about their own employment situation. That would provide us with ambiguous data. To establish the employment situation, Statistics Netherlands has its own definition which involves job search activities, the desired number of working hours and the availability to start a job. A series of questions is asked to determine the value of the employment status. This means that we cannot take

a single basic question from the LFS questionnaire in order to observe the employment or unemployment. In section 3.2 we describe the set of basic questions that we have used in the BQA to determine the employment situation.

The data collection design of the BQA is mixed-mode. Addresses for which a listed, land-line telephone number could be found were approached by CATI. Addresses for which such a link could not be established were approached by a combination of a paper questionnaire and a web questionnaire. An advance letter with a paper questionnaire was sent to the selected addresses, and in the letter the selected person in the household was presented the choice to fill in the questions on the internet (web questionnaire) or to return the paper questionnaire by mail (no stamp needed).

In Table 3 the design of the basic question approach in the LFS is summarized. Also the LFS sample size and response rates are given, differentiated to households with and without a listed land-line phone. The LFS response rates correspond to households of which all eligible members filled in the questionnaire. In the BQA only one person is selected per household. Hence, the denominators in the BQA and LFS response rates both consist of households. The LFS is a face-to-face survey, but we can artificially split the sample in two parts by linking the indicator for a listed phone number.

Table 3. Design of the BQA in the Dutch LFS.

	<i>Mode</i>	<i>Sample size</i>	<i>Response rate</i>
Control group	Telephone	667	80%
	Paper or web	333	25%
LFS	Listed phone	10137	68%
	No listed phone	7939	55%

The response in the paper and web group is low. We did expect this since self-administered surveys in general have lower response rates than interviewer-assisted surveys. Also, persons that are approached with this combined variant do not have a listed telephone. We know from previous research, e.g. Schouten (2004), that persons without a listed telephone participate less in surveys. Fur-

thermore, we decided not to use reminders as this would complicate the design of the BQA. Another reason may be that two modes were offered. Griffin, Fischer and Morgan (2001) found that offering multiple modes of response in a mailing resulted in a lower response rate. They suspect that offering a mode of response other than mail, in combination with a paper questionnaire, contributes to a break in the response process and thus results in a lower overall response rate. The response in the telephone group of the BQA is considerably higher than in the LFS sample with a listed phone number. Again, this is no surprise as the questionnaire is substantially shorter and only one person has to respond.

There is one practical problem attached to the next birthday selection in the telephone group of the BQA. For each sampled address only one phone number is selected in case there is more than one listed phone number. This implies that at addresses with multiple households we may not find the person that we intend to select whenever different households have different phone numbers. In the analyses we ignore this practical problem as only in a very small proportion of the addresses this occurred.

3.2. Basic Questions of the LFS

The target population of the LFS consists of persons aged 15 to 65. Hence, all members of a selected household, i.e. a household on a selected address, that fall within this range are eligible for the LFS. For these persons, we are interested in their employment situation. The definition of Statistics Netherlands states that a person falls in one of the following three categories:

1. Employed
2. Unemployed
3. Not a member of the workforce

When persons *have a paid job* for at least 12 hours a week, they fall into the first category and are employed according to the definition of Statistics Netherlands. When this is not the case (persons that have a paid job for less than 12 hours a week or that do not have a paid job at all), it has to be established

whether or not they *would like to have a paid job* for at least 12 hours a week. If persons do not want this, they are not considered to be a member of the workforce population. If persons do want to have a paid job for at least 12 hours a week, there are two criteria to determine whether they belong to the workforce and are thus unemployed, or do not belong to the workforce. These criteria concern the *job search behaviour* and the length of *time before persons can start working* for at least 12 hours a week.

The first criterium is the job search behaviour. If, during the four weeks prior to the survey, persons have undertaken some activities to find a new job or to expand the working hours to at least 12 hours a week, this is considered as active job search. Also, when they have been actively searching in the last half year, but not during the four weeks prior to the survey because they are awaiting the outcome of a job interview, this is classified as an active job search. When it comes to actively searching for a job, even checking the newspaper for job vacancies counts. If a person is not actively searching, he or she is regarded not to be a member of the workforce.

The second criterium is the availability for a paid job. It is determined how much time it will take before a person can actually start a new or additional job. If this is less than two weeks, then the person is, according to Statistics Netherlands, unemployed. If it will take less than three months before he or she can start, then it depends on the reason for this. If it is due to parental obligations, holidays or illness or because of the time needed to finish a former job (paid or voluntary), then persons are also classified as unemployed. All other reasons, like time needed to graduate, cause persons to be classified as not being a member of the workforce.

Persons may have more than one paid job. For this reason in the LFS questionnaire respondents are asked for working hours in separate jobs with a maximum of three jobs. The answers for the separate jobs are combined to a single job status.

Hence, there is a number of questions that we need to ask in order to determine the employment situation according to the definition. The basic questionnaire must contain all these questions to derive the variable of interest of the LFS, i.e. the employment situation. The LFS questionnaire starts with all

questions related to the derivation of the employment status. The condensed telephone questionnaire with basic questions is in fact equal to the first block of questions in the LFS questionnaire. This is fortunate as it may be expected that mode effects are less likely when questions are asked at the same time. However, in the paper and web versions of the basic questions we made one major simplification. We do not ask for the characteristics of multiple jobs but for the characteristics of all jobs together. Hence, we leave it to the respondent to combine for instance the working hours in case he or she has more than one job. It was decided to not make this distinction in the paper and web versions because of the complex routing it would lead to. The paper and web questionnaires are similar and can be found in the Appendix.

Depending on the actual employment situation, persons will be asked at most 10 questions. The questionnaire takes between 1 and 3 minutes. Interviewers were instructed to inform respondents that the questionnaire would take approximately 2 minutes to answer.

3.3. The selection of respondents

As opposed to the regular Labour Force Survey, we did not interview every person on a selected address in the basic question approach. After all, the motivation for the application of the BQA is to considerably lower the response burden to persuade persons to participate. As a concession to this idea, we decided to randomly select one person within each selected address. We only asked for this persons cooperation and we also allowed for proxy-interviewing.

The literature (Kish 1949, Salmon and Nichols 1983, Oldendick et al. 1988, Lavrakas et al. 1994, Binson et al. 2000 and Gaziano 2005) identifies several methods to randomly select one person within a household. The main objective of these procedures is to obtain a sample that is representative of the target population of the survey. However, recently Clark and Steel (2007) discussed the selection of respondents within households in order to derive a maximal accuracy as persons within households are often very similar with respect to survey topics. In the BQA we wanted to select a person at random within a household so that the selection does not affect the composition of the sample.

The most widely known procedure is the probability method from Kish (see Kish (1949)). Here, the interviewer has to enumerate all the eligible members of the household based on gender, and within gender, ordered by age (young to old). The eligible household members are labelled according to this ordering. If there is more than one eligible member, the interviewer uses the so-called Kish grid to randomly select one of the members. The Kish grid is a contingency table in which the household size is plotted against the household label that is to be selected. The survey organisation disposes of a number of such tables which they randomly attach to the questionnaires before they are allocated to interviewers.

Alternative quasi-probability procedures are proposed in literature: the last birthday method and the next birthday method. The last birthday method selects the eligible person within the household that most recently had its birthday. Likewise, the next birthday method consists of interviewing the person who is the next to have its birthday.

Based on the research by Binson et al. (2000) and Salmon and Nichols (1983), we decided to use the next birthday method in the BQA. In the pre-notification letter for the paper and web questionnaires, it is stated that the questionnaire has to be completed by someone of 15 years or older, and that this person has to be the next to have its birthday. In the telephone version, the interviewer states that the questions have to be answered by (or for, because proxy is allowed) the person in the household that is at least 15 years old and that has the next birthday.

Cobben and Schouten (2007) investigated the next birthday selection of respondents in the BQA pilot. For this purpose they linked various administrative data to the sample. From the municipality registers the birth dates of all household members are linked. This auxiliary information enables a check of erroneous selections. They find that for the telephone group in about 16% of the cases the questionnaire was filled in by a member of the household other than the intended respondent. However, they conclude that there is no evidence that the errors are related to any characteristic of the household or the respondent. The only exception is the position in the household. They find that in case the intended respondent is a child, then more often one of the parents erroneously answered the questions. Cobben and Schouten (2007) did not investigate the selection in

the paper and web groups of the pilot as the response was very low, leaving too few cases to draw conclusions.

In the following we will assume that the next birthday selection does cause errors but that these errors are random. Consequently, we view the selected respondents as a random subset with a selection probability that is equal to one over the number of eligible persons in the household.

4. Mode effects and the basic question approach

The basic question approach serves two main goals. The first is to compare the most important variables in the survey for respondents and non-respondents to detect any differences. The second is to use the extra information to adjust for these differences, where possible. However, in order to be able to make a comparison and to employ the additional response, we need to assess whether there are any mode effects. The design of the BQA may cause answers to the basic questions to differ from the answers to the corresponding questions in the regular LFS. In the BQA we cannot disentangle non-response bias from mode effects, which means that we are not able to attribute observed differences between respondents and non-respondents to selective non-response.

For this reason, the control sample was set up and interviewed with basic questions only. We compare the BQA response to the regular LFS response to see if there are any mode effects. We refer to mode effects as the sum of all errors that occur because of a different interview mode and the use of the condensed questionnaire with basic questions.

4.1. Auxiliary information and sampling design

Cobben and Schouten (2007) showed that there is no strong evidence that the next birthday approach in the BQA pilot resulted in a non-random selection of respondents within households. We will assume that the respondents are selected at random within households.

We want to investigate whether there is a difference in non-response bias between the regular LFS answers and the answers obtained with the BQA pilot.

For a correct analysis of the observed differences, we have to account for the different inclusion probabilities in the two groups.

The differences in inclusion probabilities are due to the next birthday selection, to a geographic depletion of the sample in the LFS and due to unequal inclusion probabilities for age groups in the LFS. In the regular LFS, every household on a selected address has to participate in the survey. Within each household, all the eligible members are asked to participate. Hence, the inclusion probability of a person equals that of his or her household. In the BQA we randomly selected only one person within each household. Furthermore, in the regular LFS the sample has been depleted for specific regions of the Netherlands and for elderly persons. We have the inclusion probabilities for the households in the LFS. The inclusion probability in the BQA depends on the number of persons living on the address, which we denote by $npers$. The probability that a person is selected in the sample is thus equal to $1/npers$.

We have a number of background characteristics that come from several registers. These registers together form the Social Statistical Database (in Dutch: Sociaal Statistisch Bestand or SSB). Table 4 gives an overview of the available information for the analysis. The auxiliary variables constitute demographic, geographic and socio-economic characteristics on the household level. Gender, age and ethnic background are individual characteristics. These were transformed to household characteristics by regarding the composition of the household core, i.e. the head of the household and the partner if present. The 'gender' of the household was classified as all male, all female or a mix. The same was done for ethnic background, i.e. all native, all Moroccan, etc. The age of the household was defined as the average age of the household core. The same was done for jobs and allowances. We aggregated the individual indicators in two different ways. We computed whether at least one member has a job or allowance and we computed the total number of jobs and allowances in the household core. The average house value is computed as the average over all households with the same zip code.

We have to aggregate auxiliary variables to the household level because of the design of the LFS and BQA pilot. In the LFS non-response is linked to the household. Clearly, this holds in case no contact was made with household.

However, in case of a refusal we do not know which member of the household actually refused participation. The analysis of non-response thus concerns the household. In the BQA we did select only one person, but the person is selected after contact is made and after the household states that it is willing to participate.

Table 4. Available background information.

<i>Variable</i>	<i>Categories</i>
Listed phone number	yes, no
Urbanicity	very strong, strong, moderate, low, not
Part of country	north, east, west, south
Province and large cities	12 provinces plus Utrecht, The Hague, Rotterdam and Amsterdam
Gender	all male, all female, male & female
Average age	15 - 34, 35 - 54, 55+
Ethnicity	Native, Morrocan, Turkish, Surinam/Dutch Antilles, other non-Western, other Western, mixed
Average housevalue (in 1000's of Euros)	missing, 0 - 50, 50 - 75, . . . , 125 - 150, 150 - 200, . . . , 250 - 300, 300 - 400, > 400
Type of household	Single, unmarried no/c ² , married no/c, unmarried w/c ³ , married w/c, single parent, other, mixed
Paid job	yes, no
Self-employed	yes, no
Unemployment allowance	yes, no
Disability allowance	yes, no
Social allowance	yes, no
CWI subscription	yes, no

The dataset for the regular LFS for the period July 2006 - October 2006 consists of 36,926 persons. The control sample consists of 1000 persons. We compare the composition of the LFS to that of the control group, see Figure 1, by employing the auxiliary information from the SSB. For the comparison of the

non-response bias, we restrict the analysis to the respondents in both datasets, see Figure 2. The respondents in the control group and the LFS are indicated by the shaded areas.

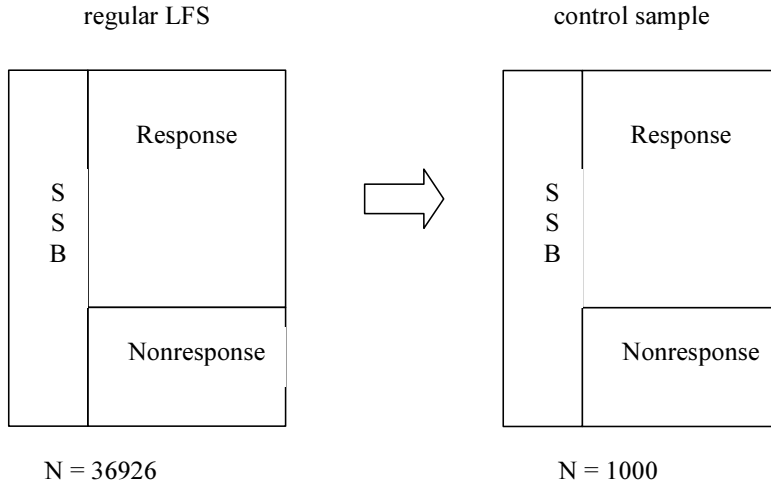


Figure 1. Data for comparison of regular LFS response and Basic Question response.

We, first, compare the characteristics between the two different samples, in a univariate analysis. Since inclusion probabilities are different we cannot employ standard statistical tests and model selection strategies. The test statistics need to be adjusted for the sample designs. In section 4.2 we start with univariate analyses. Next, we compare the characteristics multivariately in section 4.3.

In both analyses we compare the characteristics for the respondents in the regular LFS to the respondents in the control sample. Because we find a large difference in response rates for the paper and web groups and the telephone groups, we also investigate differences for respondents with a listed land-line phone.

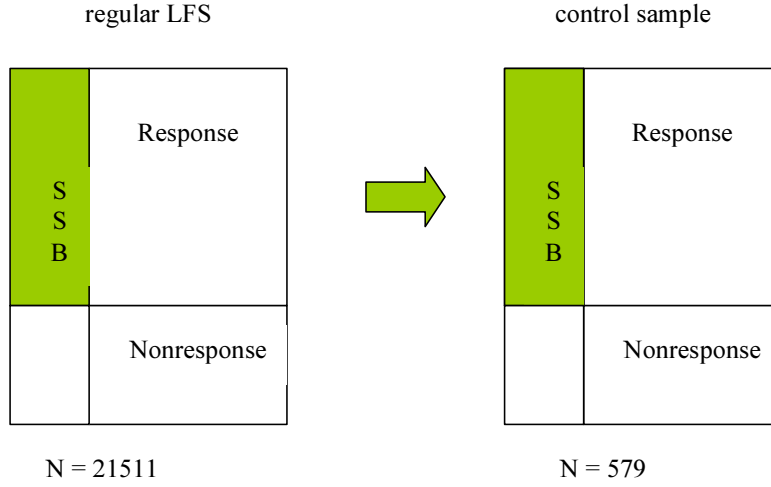


Figure 2. Background characteristics linked to the data for comparison of respondents in the regular LFS and the control sample.

4.2. Univariate analysis of response

In this section, we compare the characteristics for respondents in the control sample and the regular LFS (see Figure 2). For the variables in Table 4, we compare the distribution of the categories over the respondents. We test for a difference using the Wald statistic adjusted for unequal inclusion probabilities, see Rao and Scott (1984). This test statistic is available in standard statistical software. The null hypothesis of this test is that the distribution of the characteristics over both samples is independent. Under the null hypothesis, the Wald statistic has a $F(r, q)$ distribution, where r denotes the number of free parameters minus 1 and q the number of observations minus the number of free parameters. We choose $\alpha = 0.05$.

We first compare data for all the respondents, as displayed in Figure 2. The only variables where a significant difference is detected, are telephone ownership and whether the household received an unemployment allowance. See Table 5. Due to the difference in data collection mode, the percentage of response is very different in the control sample when differentiating with respect to telephone

ownership, see Table 3. Persons with a listed telephone are approached by CATI, an interviewer-assisted data collection mode. The other persons are approached by a combination of paper- and web-questionnaires. As a result of the low response rates to the paper and web questionnaires, the composition of telephone ownership is seriously affected by the BQA design. We have no good explanation, however, for the observed difference in employment allowances. It may be related to the population coverage of the interview modes.

Table 5. Univariate analysis of BQA and LFS response

<i>Variable</i>	<i>Regular LFS</i>	<i>Control sample</i>	<i>p-value</i>
Telephone			0.0000
yes	67.1%	87.6%	
no	32.9%	12.4%	
Unemployment allowance			0.0057
yes	13.1%	8.9%	
no	87.0%	91.1%	

Based on the findings, we decided to continue the analysis comparing only those respondents that dispose of a listed telephone and could be contacted by CATI. See Figure 3.

The weighted response proportions in BQA and LFS for the various auxiliary variables are displayed in Tables 6, 7, 8 and 9. For each variable the p-value corresponding to the Wald statistic is also given. The proportions are restricted to the telephone group of the BQA and the households with a listed phone number in the LFS.

The variables for which a p-value $< 0,05$ has been found are: type of household, unemployment allowance and social allowance. There are more persons with an unemployment allowance in the control sample, as well as more persons with social allowance. Also, there are more persons that are not married in the control sample, and the percentage of addresses where more than one type of household is present is higher in the control sample than in the regular LFS. With respect to these variables, we have to conclude that the response obtained by the basic

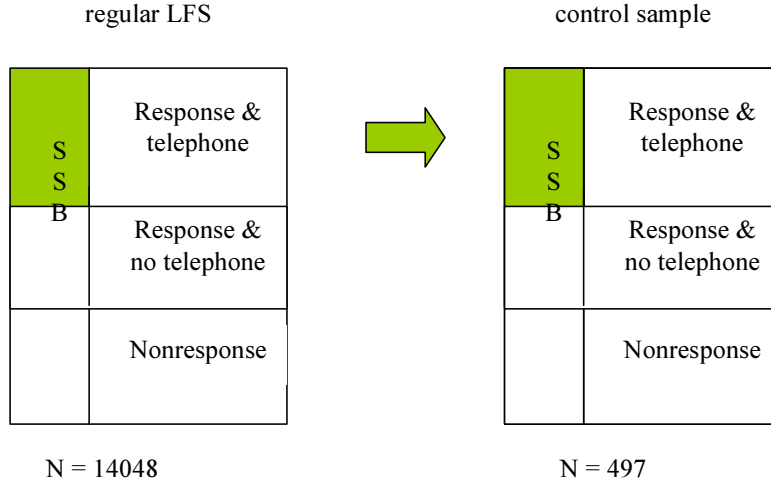


Figure 3. Background characteristics for respondents in the regular LFS and the control sample with a telephone.

question approach in the control sample is distinct from the response obtained in the regular LFS. To validate these findings, in the next section we perform a multivariate analysis.

4.3. Multivariate analysis of response

Based on the univariate analysis in the previous section, there are indications that the composition of the response in the control sample is different from that of the regular LFS with respect to type of household, unemployment allowance and social allowance. To validate these findings we fit a multivariate model to explain the differences between the compositions of the BQA and LFS response groups.

For the analysis, we combine all the respondents data and attach weights according to the sampling designs of the LFS and the control sample. Next, we define the variable LFS_i that indicates for person $i = 1, \dots, N$ whether this

person responded in the regular LFS, $LFS_i = 1$, or in the BQA, $LFS_i = 0$. So,

$$LFS_i = \begin{cases} 1 & \text{if person } i \text{ is a respondent in the LFS} \\ 0 & \text{if person } i \text{ is a respondent in the BQA} \end{cases}$$

This variable forms the input to a weighted logistic regression.

The logistic regression models the probability that a person is a respondent in the LFS, given that her or she is a respondent in either the LFS or the BQA. By using weights we adjust for the unequal inclusion probabilities in the two samples. If response probabilities are the same for the LFS and BQA, then the model explains the difference in the number of sampled addresses in the BQA and LFS. Clearly, this difference is independent of any background characteristic. Hence, in that case it suffices to incorporate an intercept in the logistic regression. Of course, we know that the response probabilities are different for the LFS and BQA. However, if the response probabilities are the same within the LFS and also within the BQA, then again a logistic regression model with an intercept is sufficient. As a consequence, if any of the background characteristics is incorporated in the logistic regression, then it means that the BQA and LFS response mechanisms are different. This difference is not just in overall level of response but also relative within different groups in the population. The logistic regression model points to those groups in the population that have a different response behavior in the LFS and BQA approaches.

We follow the model selection strategy from broad to specific, i.e. we start with a model containing all variables and stepwise remove variables until all variables give a significant contribution. We fitted a model to the response indicator LFS for response in the regular LFS, $LFS_i = 1$, and response in the control sample, $LFS_i = 0$. The variables that are used are the same as in the univariate analysis, see Table 4. We used the adjusted Wald Statistic to test the joint significance of the categorical variables. The null hypothesis of this test is that all the coefficients of the categories of a variable are equal to 0, and the variable thus is insignificant. Following the results for the univariate analysis, we fitted the model to the respondents that dispose of a listed land-line telephone. See Figure 3.

The results for the full logistic regression model and the final logistic regression model are displayed in Table 10. In the final model, only two (significant)

variables remain: disability and social allowance. With respect to these two variables, the response amongst the telephone-owners in the control sample is selective compared to the regular LFS.

If we assume that the response mechanism is Missing-at-Random (MAR), then within the strata defined by disability and social allowance the households are homogeneous. In other words in those strata respondents and non-respondents cannot be distinguished from each other. This assumption cannot be tested, however. The response mechanism may be Not-Missing-at-Random (NMAR) with respect to the main survey topics. We, however, used auxiliary variables that are closely related to employment like having an unemployment allowance, having a paid job and being subscribed to the CWI database. As a consequence the impact of the detailed employment status on non-response error is reduced.

4.4. Mode effects

In the previous section, we compared background characteristics for the regular LFS respondents and the respondents in the BQA. We did so to assess whether there was a difference in response patterns between the two different approaches. One of the main conclusions of the response analysis, is that the design of the BQA caused a break in the composition of the respondents with respect to telephone ownership. The response rate in the paper and web group was very low which made us decide to neglect this group and restrict attention to the telephone group.

In this section, we compare the survey target variable for the LFS: employment status. To account for the different response patterns, we perform a (weighted) logistic regression as explained in the previous section. The dependent variable of the regression is the indicator *LFS*, like in the non-response analysis in the previous section. As explanatory variables we include the variables disability allowance and social allowance to account for the non-response bias, and the target variable employment situation. We first fitted this model to the respondents in both the LFS and the control sample that have a fixed land-line telephone (Figure 3), and then we used the adjusted Wald statistic to test for the (joint) significance of the categories of the variables. The results are

displayed in Table 11. The variables disability allowance and social allowance are included to adjust for the difference in response pattern.

From Table 11 we can see that the null hypothesis of independence on employment status conditional on receiving a disability and/or social is not accepted, i.e. $p > 0,05$. This implies, that we cannot explain whether persons were a respondent in the regular LFS or in the BQA based on the answers to the survey questions. From this finding we conclude that there is no evidence that moving to a condensed questionnaire and a different interview mode affected the employment status.

5. Conclusions and discussion

From July to October 2005 Statistics Netherlands conducted a pilot with basic questions for the Dutch LFS. The basic questions consisted of all questions that are necessary to derive the employment status, which is the main statistic of the LFS. Depending on the actual employment status of the respondent, the strongly condensed questionnaires took between 1 and 3 minutes to fill in. The basic questions were only posed to a single person in the household, namely the person whose birthday is the first to come. The basic questions were filled in by CATI in case we disposed of a land-line phone number. All households without a listed number received a letter with a paper questionnaire attached and a login for the website that contained a web version of the questionnaire. Approximately 67% of the households was allocated to CATI.

The basic question approach was applied both to non-respondents in the LFS and to a new control group. The analysis of the additional response from initial non-respondents will be discussed in a different paper. Here, we concentrate on possible mode effects. A change of questionnaire and interview mode often results in measurement errors, which are usually referred to as a mode effects. If we do not assess the impact of mode effects, then we cannot draw any conclusions about the impact of non-response error in the LFS. The control group was established for this purpose. The control group consisted of a new sample out of the population.

In an earlier paper Cobben and Schouten (2007) concluded that the next

birthday selection of persons within households does not lead to a selective group of respondents. In this paper we assumed, therefore, that the selection process does not affect the composition of the response.

We investigated the impact of mode effects by linking auxiliary variables from various administrative sources. The analysis was done in two steps. In the first step, we compared the composition of the response of the control group in the basic question approach to that of the LFS. In this comparison we looked at all available auxiliary variables both in a univariate and in a multivariate setting. From this analysis we concluded that the response only differs with respect to having a disability allowance and having a social allowance. Next, we compared the composition of the response with respect to the employment status, which we can derive from the basic questions. We found no evidence that employment status is affected by mode effects. Within strata defined by disability and social allowance we found no significant difference between the basic question approach and the LFS.

We have to make three remarks. First, we only compared the persons in households with a listed land-line phone number. As the response rate for paper and web questionnaires was very low, we decided not to compare the total set of respondents. Second, we cannot fully disentangle mode effects from non-response error. It may be that within strata the response is selective with respect to employment status. Consequently, we draw conclusions about the sum of mode effects and remaining non-response error. As we employed variables that are closely related to employment, we conjecture that the remaining non-response error is small. Furthermore, there is no way to decompose these errors in practice. If one would decide to use the basic question approach then it is advisable to look at the sum of both errors as non-response adjustment methods only calibrate auxiliary variables. Third, the sample size of the telephone group in the basic question approach was 667, which implies that conclusions need to be drawn with some care.

However, keeping these remarks in mind, we conclude that there is no evidence that mode effects affected the answers to the basic questions in the study. In the analysis of the application of the basic question approach to the initial LFS non-respondents, we will assume that we observe differences that are due

to non-response error alone.

Table 6. Univariate analysis telephone respondents (1).

<i>Variable</i>	<i>Regular LFS</i>	<i>Control sample</i>	<i>p-value</i>
Urbanicity			0.0632
very strong	16.1%	21.0%	
strong	21.6%	22.8%	
moderate	19.2%	18.5%	
low	21.6%	18.0%	
not	21.5%	19.7%	
Type of household			0.0079
single	12.7%	12.7%	
unmarried no/c	5.7%	6.4%	
married no/c	29.1%	26.4%	
unmarried w/c	3.9%	5.0%	
married w/c	41.7%	38.6%	
single parent	3.7%	4.4%	
other	0.3%	0.2%	
mixed	2.9%	6.3%	
Part of country			0.8390
north	7.9%	8.4%	
east	16.9%	16.6%	
south	24.0%	22.2%	
west	51.3%	52.8%	

Table 7. Univariate analysis telephone respondents (2).

<i>Variable</i>	<i>Regular LFS</i>	<i>Control sample</i>	<i>p-value</i>
Province and large cities			0.2556
Groningen	1.2%	2.2%	
Friesland	6.3%	6.2%	
Drenthe	0.5%	0.0%	
Overijssel	9.9%	9.8%	
Gelderland	6.9%	6.8%	
Utrecht	9.3%	7.6%	
Noord-Holland	15.2%	17.1%	
Zuid-Holland	16.0%	14.4%	
Noord-Brabant	12.4%	11.0%	
Limburg	11.6%	11.2%	
Amsterdam	2.5%	4.2%	
Rotterdam	3.1%	3.6%	
Den Haag	3.4%	3.3%	
Utrecht	1.8%	2.7%	
Gender (core)			0.700
all male	6.8%	7.4%	
all female	11.0%	10.1%	
male & female	82.2%	82.5%	

Table 8. Univariate analysis telephone respondents (3).

<i>Variable</i>	<i>Regular LFS</i>	<i>Control sample</i>	<i>p-value</i>
Average age (core)			0.0641
15 - 34	11.1%	14.8%	
35 - 54	47.9%	45.3%	
55+	41.0%	39.9%	
Ethnicity (core)			0.4026
native	82.1%	79.0%	
Moroccan	0.2%	0.0%	
Turkish	0.3%	0.5%	
Surinam/Dutch Antilles	0.4%	1.0%	
other non-Western	3.3%	3.7%	
other Western	0.8%	0.6%	
mixed	13.0%	15.4%	
Average housevalue (postal code)			0.7327
not available	7.6%	7.0%	
< 50	0.7%	0.4%	
50 - 75	5.0%	5.6%	
75 - 100	11.1%	11.6%	
100 - 125	15.5%	17.9%	
125 - 150	18.0%	19.3%	
150 - 200	23.2%	22.4%	
200 - 250	10.4%	9.6%	
250 - 300	4.3%	3.0%	
300 - 400	3.2%	2.1%	
> 400	1.1%	1.3%	

Table 9. Univariate analysis telephone respondents (4).

<i>Variable</i>	<i>Regular LFS</i>	<i>Control sample</i>	<i>p-value</i>
Paid job (address)			0.4036
yes	70.5%	72.3%	
no	29.5%	27.7%	
Self-employed (address)			0.3781
yes	12.9%	14.5%	
no	87.1%	85.5%	
Disability allowance			0.0334
yes	12.0%	8.7%	
no	88.0%	91.3%	
Unemployment allowance			0.2363
yes	7.2%	8.9%	
no	92.8%	91.1%	
Social allowance			0.0061
yes	2.4%	4.6%	
no	97.6%	95.4%	
CWI subscription			0.2669
yes	11.8%	13.7%	
no	88.2%	86.3%	

Table 10. Multivariate analysis telephone respondents.

<i>Variable</i>	<i>Complete model</i>		<i>Final model</i>	
	<i>F-value</i>	<i>p-value</i>	<i>F-value</i>	<i>p-value</i>
Urbanicity	0.99	0.4132		
Type of household	1.31	0.2686		
Part of country	1.85	0.0728		
Province and large cities	0.90	0.5256		
Gender (core)	1.99	0.1364		
Average age (core)	1.47	0.2301		
Ethnicity (core)	0.54	0.7423		
Average housevalue (postal code)	0.58	0.8285		
Paid job (address)	0.13	0.7176		
Self-employed (address)	1.04	0.3082		
Disability allowance	3.83	0.0504	4.58	0.0323
Unemployment allowance	1.58	0.2086		
Social allowance	8.50	0.0035	7.34	0.0067
CWI subscription	0.95	0.3308		

Table 11. Measurement error analysis.

<i>Variable</i>	<i>F-value</i>	<i>p-value</i>
Employment situation	2.22	0.1087
Disability allowance	4.00	0.0455
Social allowance	8.83	0.0030

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APPENDIX

1. *Do you currently have a paid job? (Also 1 hour a week or a short period count, as well as freelance work)* - Yes: Go to question 2 - No: Go to question 6

2. *Are you employed or self-employed? (In case you have more than one employment, please answer the question for the employment with the maximum of working hours)* - Employed: Go to question 3 - Self-employed: Go to question 4

3. *Do you currently have a permanent appointment?* - Yes - Partially - No

4. *How many hours do you work on average?*

.... hours per week

5. *Do you currently want to work more hours than you do now, possibly in a new appointment?* - Yes: Go to question 10 - No: End of questionnaire

6. *Do you currently want to have a paid job? (Also 1 hour a week or a short period count, as well as freelance work)* - Yes: Go to question 8 - No: Go to question 7 - I want to but cannot: Go to question 7

7. *What is the main reason that you currently cannot accept a paid job?* - Care for family/household: End of questionnaire - Education or study: End of questionnaire - Retirement or age: End of questionnaire - Illness, disability or bad health: End of questionnaire - Other reason: End of questionnaire

8. *At what notice can you start the new job?* - Within 2 weeks: Go to question 10 - Between 2 weeks and 3 months: Go to question 9 - Between 3 and 6 months: Go to question 9 - More than 6 months: Go to question 9

9. *Do you need time to finish activities related to:?* - Volunteer work - Education or study - Child care - Illness - Vacation - Other reason

10. *How many hours do you want to work?*

.... hours per week

11. *Did you undertake any activities over the last 4 weeks to find a job? (Reading adds in a paper already counts)* - Yes - No

12. *How many months have you been looking for a job?*

.... months