Is one week sufficient? On measurements errors in the Norwegian Consumer Expenditure Survey

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Statistics Norway has carried out a Consumer Expenditure Survey (Household Budget Survey) without major changes every year since 1974. This is a survey with a high response burden for the respondent and with a low response rate, only about 50 percent complete the survey. During the data collection for the 2008 survey, Statistics Norway conducted an experiment in order to test whether a reduced burden could have a positive impact on the response rate. An experiment group was asked to fill in the diary for one week instead of two weeks, and the response rates were compared with a control group. Our analyses showed that lowering the response burden had a positive effect on the response rate (Löfgren et al. 2010). But we also have to take data quality into consideration. Can the data on household expenditure be of acceptable quality even if the respondents fill in for one week instead of two? The "word of mouth" inside the organisation suggested that respondents needed the first week to "learn how to record" their consumer unit's expenses, with the result that the second week was more accurate and showed more consumption. Survey research suggest that lowering the response burden for the respondent can result in overall lower data quality because respondents with a lower motivation to report accurately is recruited into the net sample. In order to test this we compared the mean of number of consumer goods recorded and the mean of total consumption expenditure between the control group (two week) and the experiment group (on weeks). Our findings suggest that the respondents who keep a diary for one week have higher data quality than the ones who record for two weeks. This is true also when we control for different demographic variables.

Background

The aim of the survey is to provide a detailed description of the consumption of private households (for details see: http://www.ssb.no/english/subjects/05/02/forbruk_en/). The survey is based on personal interviews and detailed accounting in a sample of private households based on randomly drawn persons from 0 to 79 years of age. The sample is drawn proportional to the household size, and the annual sample consists of 2 200 households. The data in the Consumer Expenditure Survey is collected by a multimode design: an introductory interview, the completion of accounting books, and a concluding interview. The data collection process is as follows:

- The household is notified that Statistics Norway wishes to get in contact and perform an interview. The envelope also includes a brochure explaining the use of the survey and why it is important that everybody participate . Also a calculator is included as a prepaid incentive.

- The interviewers contact the household to set up an interview. They may try to contact the household by telephone. The telephone numbers of the listed persons in the household are given to the interviewers together with other information about the household such as address, household composition and so on.

- A Computer assisted personal introductory interview is conducted. In this interview the interviewer maps the household and explains how the accounting diary shall be filled inn. Normally this takes about 10 minutes.

- The household fills in the accounting books. There is a main book for the household and additional books for each household member over 15 years. The accounting period is 14 days.

- A concluding interview takes place shortly after the accounting period is finished. Here the interviewer collects the accounting books and asks the household several questions about items and so on. The household receives a gift card (about 40 Euro) as an incentive.

During the past years considerable resources have been allocated to keep the total response rate of the survey at a "tolerable" rate of about 50 percent. In 2007 a project group consisting of methodologists, survey practitioners and users of the Consumer Expenditure Survey in Statistics Norway was established to discuss a possible new design for the survey. All the members of the group were asked to complete the survey(s) themselves in order to get a feeling of the response burden from the respondent's point of view. It was evident to all the members that this is a survey with a high response burden. In order to get more empirical data about the relationship between response burden, incentives and nonresponse we set up an experiment in the survey (2008). In order to lower the response burden we wanted to experiment with a shortened accounting period. The second treatment in the experiment was incentives used to motivate the households. We used unconditional prepaid monetary incentives and promised monetary incentives; gift cards with different values. The different treatments and groups in the experiment can be viewed in Table 1 below.

Table 1. Treatments and groups in the experiment. Source Løfgren et al. 2010.

	Incentive		
	NOK 300 promised	NOK 300 in advance	NOK 500 in advance
Accounting Period			
2 weeks	*Group 1 (Control Group)*	*Group 2*	*Group 3*
1 week	*Group 4*	*Group 5*	*Group 6*

Group 1 was set as control group for the experiment, following current practice; i.e. accounting for fourteen days plus a promised gift card of NOK 300. The gift cards in advance were brought by the interviewers when the first interview took place. The respondents were distributed among the interviewers

randomly to secure that each interviewer would work with respondents from all six groups in the experiment. The treatments were distributed in the sample so that the experimental groups were of equal size (N = 122), while the control group was as large as the five experimental groups together (N = 560).

The experiment showed that all the deviations from the regular program had a positive effect on the responserate (see figure 1). *The results are in line with previous work and experiments with incentives made within the field. Prepaid incentives work better than incentives promised at completion. Shorter accounting period which here implies lower response burden, results in a higher willingness to participate and a better response rate. Monetary incentives do have an effect and the bigger value the better, but in our case NOK 500 was only marginally better than NOK 300.* (Löfgren et al. 2010:4)

Figure 1. Response rates in the different experimental groups. Source Løfgren et al. 2010.
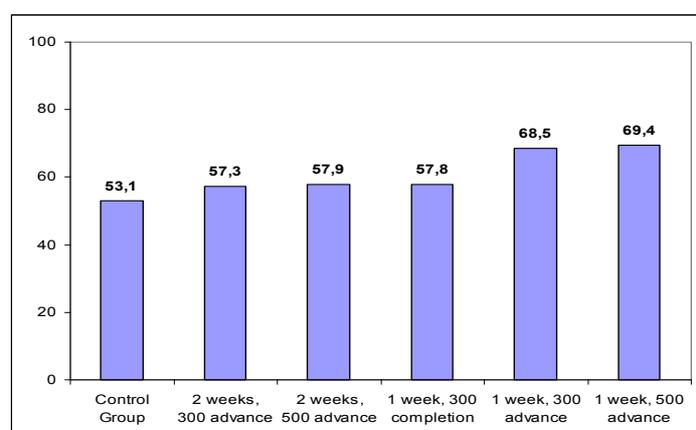
But what about the quality of the data? The "word of mouth" inside the organisation suggested that respondents needed the first week to "learn how to record" their consumer unit's expenses, with the result that the second week was more accurate and showed more consumption. Survey research suggest that lowering of the response burden and increasing the incentive can result in overall lower data quality because respondents with a lower motivation to report accurately is recruited into the net sample. This is in a way similar to what can happen to data quality when initially refusers to a survey is converted into respondents. Converted refusers may exert less cognitive effort to respond, or interviewers may be more willing to accept 'satisficing' responses from reluctant respondents to obtain a completed interview (Triplett et al. 1996). The survey research literature is however inconclusive on this effect, there are reports of significant differences when comparing survey estimates with and without converted refuseres. Burton et al. (2006) cited various studies on this topic and found that the difference was found in less than half of the survey measures, and some of this disappeared after controlling for demographic background variables. In a study of the effect of refusal conversion on data Quality in the US Consumer Expenditure Survey McDermott and Tan concluded that there was evidence of poorer data quality among converted refusalers. They reported less complete reporting of expenditures and: *when converted refusers agree to do the survey, they are more likely to rush through it and, thus, to provide poorer quality responses* (McDermott and Tan 2008:30)

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Our working hypothesis was that the households asked to record their consumer expenditures for one week would have poorer data quality then the ones who recorded for two weeks. In order to test this hypothesis we performed a simple test of the numbers of consumer unit's recorded and the mean of the total consumption expenditure between the groups.

Results

In table 2 we show the mean of reported consumer units and total consumption expenditure, after experiment group. The values indicate the opposite of our working hypothesis, keeping a diary for one week shows a higher mean of reported consumer units. Total consumption expenditure shows a more inclusive picture, the highest mean is in the control group, but one week shows a higher mean than for those who record for two weeks in the experimental groups.

Table 2 Mean of reported consumer units and total consumption expenditure, after experiment group.

Diary period	Incentive	Reported consumer units (divided by number of weeks). Mean	Total consumption expenditure (NOK). Mean	N
Keep diary for two weeks	Receive 300 NOK after the concluding interview	66.8	469 071	283
Keep diary for two weeks	Receive 300 NOK in advance	57.7	371 633	62
Keep diary for two weeks	Receive 500 NOK in advance	62.1	402 557	60
Keep diary for one week	Receive 300 NOK after the concluding interview	72.8	467 696	63
Keep diary for one week	Receive 300 NOK in advance	71.5	437 908	74
Keep diary for one week	Receive 500 NOK in advance	72.8	448 012	76

In order to test the significance of the results and to control for relevant background variables we performed two linear regressions, one with reported consumer units as the dependent variable (see table 3) and one with total consumption expenditure as the dependent variable (see table 4). In model 1 we include only the variables in the experiment, we see that reported one week is the only variable that is significant, reporting one week gives an increase in 9.6 consumer goods on (average). When controlling for demographic variables (model 2) this effect only drop to 9.1, which indicates this is a strong reason for falsifying our working hypothesis. There is no evidence of poorer data quality for the sample who reported for one week, when we look at number of consumer units reported by the household.

Table 3 Reported consumer units, Linear regression. (N=618)

	Model 1	Pr > I t I	Model 2	Pr > I t I
Intercept	66.2	<.0001	22.3	<.0001
Reported one week	9.6	0.0032	9.1	0.0014
Received 500 nok	2.8	0.5182	- 3.3	0.3793
Prepaid	-6.2	0.1004	- 0.6	0.8520
Number of persons in household			7.5	<.0001
Nett household Income			0.0002	<.0001
Resident in Oslo			4.6	0.3028
Resident in Other City (over 50 000 inhabitants)			9.5	0.0018
Male main person in household			-1.5	0.5922
Middle education			7.3	0.0281
High education			10.3	0.0033
Adj R – sq	0.0103		0.2528	

Table 4 Total consumption expenditure, Linear regression. (N=618)

	Model 1	Pr > I t I	Model 2	Pr > I t I
Intercept	463167	<.0001	187 045	<.0001
Reported one week	31054	0.2473	31 879	0.1609
Received 500 nok	19807	0.5765	-39 550	0.1918
Prepaid	-72369	0.0204	-23 189	0.3832
Number of persons in household			18 930	0.0073
Nett household Income			0.34509	<.0001
Resident in Oslo			-7403	0.8379
Resident in Other City (over 50 000 inhabitants)			62 392	0.0109
Male main person in household			-62 392	0.0061
Middle education			81 326	0.0024
High education			121 947	<.0001
Adj R – sq	0.0053		0.2925	

Discussion

The purpose of our paper has been to study the effect of shortening the diary period from two weeks to one week. The general view is that a long diary period leads to better data. It is always difficult to measure data quality directly; as indicators we applied reported consumer unit's and total consumption expenditure. Both indicate something about consumption volume and the effort each household have put into their recording of consumer units in the diary. Respondents with a short diary period reported more consumer units per week than those with the long period. This analysis indicates that there seems to bee a stronger effect of fatigue among the households that recorded consumer unit's for two weeks than for the ones who recorded for one week. This fatigue may result in lower data quality, and as response rates continue to drop there might comes a time when it will be almost impossible to ask households to spend

two weeks to record their consumer unit's. Still most Household Budget Surveys/Consumer Expenditure Survey uses a two week diary design, but in our view this may be difficult in the future. There are of course advantages in a two week design, it gives more recorded consumer unit's and hence lover variance but in a quality perspective one also have to take into consideration a possible bias cased by fatigue.

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