Panel effects in consumer research: Statistical models for underreporting
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Summary and discussion

When consumer-data are collected using a panel survey, the members of the panel are subject to a high response burden. The questionnaire involved is rather monotonous while the frequency is high. This response burden leads to panel effects, which will be negative: due to the repeated monotonous questions respondents become demotivated, which leads to underreporting, wave non-response, and finally to attrition.

6.1 Summary

In this thesis the separate effects of the response burden are studied. For this study data about expenditure on meat, poultry, and eggs are used. Each product had to be entered separately in the questionnaire, together with its price and volume. When these data sets are studied without any correction, it seems that consumption on meat, poultry, and eggs decreases steadily through time. Even in the month of Easter the number of eggs reported is less than the number of eggs reported in January, which is the initial month of the panel-study.

In Chapter 2 it is shown that the number of items to be entered in the questionnaire has a negative effect on the reporting level. Moreover the burden has a positive effect on the reporting of zeroes and a positive effect on wave non-response. This indicates that in general the response burden worsens the quality of the data collected.

In Chapter 3 a simple model is defined to get an estimate of true expenditure. In this model a second indicator for expenditure is used. It appears that respondents who report higher in the beginning, also report better in the following periods, while respondents with
a low initial reporting level underreport more. The percentages of underreporting are estimated between more than 30% and almost 70%.

The process of responding is modelled in Chapter 4. The time a respondent needs for answering is compared with the time the respondent actually uses for answering. The latter is proportional with the number of items entered in the questionnaire. The idea behind the model is that demotivation makes respondents spend less time on reporting, which causes the respondents to enter less items in the questionnaire than actually purchased. During the panel survey, demotivation was measured very indirectly. In estimating the model, however, it appeared that it has been measured too indirectly, which made the effect of demotivation impossible to estimate. The model is still identified though and shows the process of demotivation leading to underreporting.

Since the response burden causes respondents to temporarily cease reporting or even definitely leave the panel, at each time respondents of different ‘categories’ are present in the panel: apart from respondents that are reporting continuously, there are respondents reporting for the first time, for the last time, or before or after temporarily leaving the panel. In Chapter 5 it is shown that the change in membership of these different categories has effects on total average reporting level in the panel: generally the respondents that stay in the panel report at a higher level than those who occasionally left the panel and return. Furthermore respondents definitely leaving the panel report at a lower level than those responding for the first time, while the reverse is true for respondents temporarily coming into the panel or leaving it: before they temporarily leave, respondents report higher than when they return.

### 6.2 Discussion

Hence, if data are collected using a panel survey, a considerable body of panel effects is present. This can be taken into consideration before collecting the data: one can reduce the response burden as much as possible. Structuring the questionnaire with an alphabetic list instead of tree-structured coding makes it easier to answer the questionnaire. Furthermore it is possible to reduce the response burden by lowering the frequency of responding. Half of the sample can be questioned in one week and the other half in the other week. In this manner weekly data are collected, it is still possible to perform consistency checks, and the response burden is reduced by 50%. Hoogendoorn and Sikkel (1998) argue that this approach does not reduce the quality of the results too much.
During data collection, one should keep the quality of the data as high as possible, by avoiding wave non-response and the wrongly reporting of zeroes. By making it just as easy to enter an arbitrary number of items as to enter none, respondents cannot reduce the workload by not entering any items. An advantage of a panel survey can be used here: since more responses of the same respondent are present, it is possible to check the consistency of the present answer: whether a zero response can be expected at some moment. If respondents still do not answer a particular question, they should be called afterward and asked why no response is given. According to the answer to this call, the missing answer can be transformed into the correct answer. Of course, to be able to compare data through time, the data collection as a whole must be kept as uniform as possible, otherwise it is not possible to disentangle changes in the variable of interest and changes in response behaviour.

Afterwards, one should take the panel effects into account by analysing the data with a model that explicitly contains a component for demotivation or underreporting. For this method, the data should contain a second, independent, indicator for expenditure, to be able to use the correction method proposed in Chapter 3. If one or more indicators for demotivation are available, and the time used for answering is reported, estimation of the model in Chapter 4 is possible. A drawback of these procedures is that they both require an extra variable, which implies an extra question for the respondent. Although this increases the response burden, these extra questions are worthwhile, since the extra variables make correction for demotivation or underreporting possible.

The quality of the data can also be influenced by taking the quality of the respondents themselves into account: on the basis of previous answers, respondents can be for being continued in the panel or not. If the respondents do not 'behave well' during some period, they can be removed from the panel. This leads to a forced kind of attrition, and this attrition is hardly random. Another procedure that can be followed is to exclude specific answers from individual respondents from analysis. In Chapter 5 it is found that respondents who return after a period of wave non-response report lower than the other respondents. Accordingly, beforehand these 'disturbing' answers can be skipped for all respondents. The statistical implications of this procedure still have to be investigated. Moreover, one can choose to select only the answers of those respondents who always answer the questionnaire. Apart from the fact that this is a very small group, it will not be representative for the whole population.

One further consideration to bear in mind is the necessity of a panel survey: is it really necessary to collect data for the same respondents for a number of time-points? If the main interest is not in individual changes through time, other designs may be sufficient and more
efficient. It is recommended that only if changes through time at an individual level are important, a panel survey should be used. Then the approaches described above should be followed. Since it is never possible to collect data with perfect quality (which can be studied using the model in Chapter 2), the model of Chapter 3 should be applied to the data. To be able to do this, an extra indicator for expenditure should be thought of in advance and implemented.