

Design and Quality of the Swedish Family Expenditure Survey

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Statistics Sweden

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ABSTRACT

This report presents the design of the Swedish Family Expenditure Survey in 1988 and the methodological studies that motivated this design. It also discusses the quality the survey is expected to arrive at. A series of experiments and evaluations have demonstrated how alterations in the survey design affect the results of a survey. Choice of measurement method, the level of the response burden and the way to give incentives and compensation to the sampled families have effects on the response rate and on the level of reported expenditures in surveys of family expenditures and together with the sampling design also on the precision of the survey.

A slightly shorter version of this report was presented in March 1989 at the Bureau of the Census' conference ARC V at Arlington, U. S.. The main additions are references* to reports in Swedish, which are more appropriate to mention in a report published by Statistics Sweden. Some of the content of this report has also been presented in Lindström (S:1985), but then in a Swedish version which did not deal with the precision of the survey, the use of register data and coding and editing.

1 INTRODUCTION

Family EXpenditure Surveys (FEX) have been done in Sweden since 1907. In all there have been twenty major surveys on family expenditures. They are described briefly in Kjellegård, Lindkvist and Lindström (S:1982). The early surveys included only selected population groups like low income groups, pensioners, families in urban areas, families in rural areas, etc. In some surveys, only food expenditures were measured.

Random sampling from the entire Swedish population was introduced in the 1958 survey. Only the last four surveys - in 1969, 1978, 1985 and 1988 - have been conducted by Statistics Sweden. The next FEX is planned for 1991 or 1992. The FEX surveys can not be regarded as a series of identical surveys but the design of each subsequent FEX has been modified to meet new requirements and goals.

After the 1978 survey it was decided that the interval between the surveys should be shorter than before. To finance this, each of the following surveys were only given one third of the funds of the 1978 FEX. Technical developments have entailed some savings, but the reduction of funds has mostly led to more modest ambitions. The number of visits at home that the interviewers could do, had to be reduced and less information was collected in each survey. For example, in 1985 and 1988 respondents reported only one figure for all food and drink they bought on one occasion. Expenditures for food and drink are instead studied in detail in a special survey in 1989.

Changes in the information the users request and reduced funds together with changes in the survey climate have made it impossible to retain the same survey design from one survey to the next. Neither would the respondents accept the response burden of FEX 1969 in 1988.

We have performed a series of experiments and evaluations to adapt the survey design to changing conditions. Due to the high cost of data collection in this type of survey, the experiments were small and few results proved significant. The motives for deciding how the surveys should be designed have rather been based on qualitative information than quantitative and relied to a high degree on consistency between in-house studies and studies by other agencies. Experiences presented by Kemsley (E:1979 and 1980), (Pearl E:1968 and 1979) and Des Raj (E:1972) among others were helpful.

* References are indicated E: year when written in English and S: year when written in Swedish. There is one list of references for each language.

Due to the changing demands and also to the long interval between the surveys, the information gained from former experiments and evaluations is usually not exactly the information needed when the new survey is planned. It has to be interpreted with care each time it has to be used again.

An important part of designing a FEX is to find a balance between the sample size and the response burden. In principle, the longer each family participates, the more precise the estimates will be. Since the data collection cost per family is high, we would like to collect as much information as possible from each family. It is much more expensive to reach the same level of precision by using a larger sample and collecting less information per family. But experience, if not already common sense, tells us that an increase in response burden leads to an increase in nonresponse rate and probably also reduces data quality. This can be countered to a certain degree by compensating the families for their cooperation. On the other hand, compensation must not be too expensive since the funds could otherwise be used to include more families in the sample.

2 ORGANISATION

The Survey Research Institute for Living Conditions, Statistics Sweden, is now responsible for the planning, reporting, and analysis of the Family Expenditure Surveys. The data collection, however, is made by Statistics Sweden's centralized interviewer corps. The personnel resources, in terms of the man hours used, for the planning, analysis, and data processing at the Survey Research Institute is equal to two full-time employees.

The interviewer corps has a small centralized staff and about 200 interviewers dispersed throughout the country in numbers roughly proportional to the population of each region. Almost all of the interviewers are women. There is a low job turnover rate among the interviewers and the average interviewer has at least ten years of experience. They also participate in continuing education programs.

For the 1988 FEX, 146 experienced interviewers were selected and specially trained. They were given a high degree of autonomy and encouraged to rely on their experience, when they introduced the survey to the sampled families. 89 of the 146 selected interviewers also worked on the 1985 FEX. On the average, each interviewer was responsible for contacting about 45 families, i.e., in average less than two household every second week. Statistics Sweden does not use supervisors. The main reason for this is that about 90% of an interviewer's work entails conducting telephone interviews from her

(or in 10% his) own home. Another reason is that the interviewers' extensive interviewing experience is believed to make a supervisor somewhat redundant.

The editing, manual and automated coding, and preparation of complete files are done at a third centralised division that specialises in these tasks.

Even at a large survey organization like Statistics Sweden, each survey demands particular competence to be conducted properly. The long intervals between the FEX surveys lead to an attrition of competence and experience and has made it necessary to retrain the staff of interviewers and coders for each FEX. However it helps that staff turn-over has been low. Some of those who worked on the 1988 FEX had already joined Statistics Sweden in 1969. Experimental smallsized FEX surveys which were conducted in 1975, 1976, 1983 and 1987 during the inter-ludes between main surveys were useful to maintain the competence needed for the FEX surveys.

3 SAMPLING AND DATA COLLECTION

The 1988 FEX population consists of all persons living in noninstitutional households in Sweden during 1988. A group of people living together in an apartment or a small house and with a common economy is regarded as a family in this survey. However, families consisting exclusively of pensioners older than age 75, are excluded from the sampling frame as the rate of people living in institutional households grows rapidly with age and so does the nonresponse rate among those living in non-institutional households. In 1985, the total number of families estimated to be in the FEX population was 3,430 thousands. The average family size was estimated to 2.2 persons. About 85 per cent of the families consisted of parent (-s) and child (-ren) below 18, cohabiting couples or were one person households.

The sampling frame was the Swedish Register of the Total Population (RTP) which includes immigrants with permanent residence status. The RTP receives current information each month and is updated every third month. Swedes living abroad and those without a residential address are identified in the sampling frame and sorted out as not belonging to the target population. The Swedish social security system provides the individuals with strong financial incentives for being in the register with an address where they can be found. Consequently, the coverage rate is very high and few persons are not in the register.

The families were sampled through a simple random sample (srs) of individuals from the RTP, that has information that links spouses to each other and children under 18 to their parents. After the exclusion of nonpopulation

units, the sample in the 1988 FEX consisted of 6113 persons. The actual composition of the families that respond in the survey is established later during a personal interview.

The sampled individuals and their families were finally distributed on 26 equal-sized subsamples. Each subsample had a prespecified starting day for its period of four weeks for diary keeping. There was one starting day every second week during 1988. The diary keeping period for each family was decided through the sampling procedure in order to secure a random and equal distribution of the sample of families over the year.

Data was collected through a combination of personal interviews, diaries, and register information. An introductory interview established the composition of the family, the housing conditions, labour force participation, and other variables important for classifying the family. The family was also asked to report on some specified and important expenditures like rent and costs for insurance policies. In many cases, the families had saved receipts and bills of these expenditures. These expenditures could be written down in the introductory questionnaire at a later date if the information was not immediately available during the interview.

The interviewers were provided with the following information taken from the RTP: the name of the adult to approach, his/her age, marital status, wife/husband and children at home (age 18 and younger), and his/her residential address. In almost all cases a telephone number was identified either to the residential address or to the place of work of one of the family members. Before the initial contact, the family had already received mailed information on the importance of the survey together with a request for cooperation. About 1.5% of those included in the interviewers' assignments proved not to belong to the target population. They lived in institutional homes, were abroad, or had died since the sampling frame was updated. The noncontact rate in 1988 FEX was around 3% of the net sample.

The first contact was usually made by telephone. If all went well, the interviewer would make only one visit to the respondent's home. To do the face to face interview and to give the instructions would take less than one hour. The families were asked to record all of their expenditures during a specified period of four weeks. In about fifty per cent of all families one person does all the reporting. If the family refuses to the sampled period it can be allowed to start on the diaries two or at most four weeks later. This is done in order to keep up the response rate.

When all expenditures are estimated the contribution from diaries is about 60 per cent and 40 per cent from the introductory questionnaire. The distribution varies a lot between different categories of expenditure. Contacts via telephone were made to check if the diary keeping had started punctually and if the instructions needed to be further explained. The completed diaries were sent to the interviewer who checked if they were filled in correctly. If necessary, interviewers called the respondents and asked for corrections before the diaries were mailed to Statistics Sweden.

The final calculations are still not made but the response rate in the 1988 FEX will be less than 65% and far below the four last FEXs in which at least 72 of the net sample completed their diaries. The outcome of the data collection in four surveys is given in table 1. Population and sampling method was mainly the same in the four surveys but the reponse burden has varied a lot. In 1969 each family reported all expenditures in diaries during one month and those exceeding 25 SEK during the next two months. They also took part in one interview at the end of the year for specified expensive goods and services.

In 1978 the response burden was distributed on two independent samples as recommended by I Lyberg (S:1977). One sample reported all expenditures (complete diaries) during two weeks and answered to an additional interview on some special and important expenditures. The interview took place in the first few months of 1979. The other sample reported expenditures exceeding 50 SEK during four weeks (partial diaries). In 1985 all families had complete diaries during four weeks and answered to a questionnaire on specified large expenditures during all the year.

Table 1 Rate of completed diaries of the net sample

Result/	Year:	69	78	85	88*
			Complete Partial		
Completed diary		.76	.72 .80	.73	<.65
Right period		.73	.56 .66	.62	.56
Later period		.03	.17 .14	.10	.09
Nonrespondents		.24	.28 .20	.28	.35
Refusal		.20	.24 .17	.24	.30
Other reason**		.04	.04 .03	.04	.05
Net sample		4086	5760 7687	6001	6031

* The rates of 1988 are preliminary and rounded

** "Other reasons" were, "bad health", "not-at-home" and "don't understand Swedish".

In table 1 it is seen that from 1969 to 1985, it was possible to maintain the response rate for diary keeping households somewhat above 70 %. Also in 1958 76 % of the net sample completed four week diaries, but the sample design was different then. By European standards this response level is pretty good. To keep it, it was however necessary to reduce the response burden and to increase the interviewers' persuasive powers. L. Lyberg (S:1980) describes the efforts necessary to reduce the nonresponse in the 1978 FEX.

It has never been possible for Statistics Sweden to reach a response rate much above 75% in expenditure surveys using diaries regardless of how much the response burden had been reduced. One experience is that about ten per cent of a sample will not accept an interview in their homes but can be persuaded to answer the same questions on telephone even if it would take one hour.

With permission given by a certain authority - the Data Inspection Board - and if the respondents give their permission register information is added to sample survey information. This information and all other information provided by the families is protected according to a privacy act. Register information on nonrespondents is not used. The FEX mainly uses register data on taxed income, - including pensions and insurances - and social security. This results in a substantial reduction of the response burden and gives reliable information on income although not fully complete. To have this information is important as it permits an evaluation of the level of expenditures.

The use of registers delays the publication of results. Sample survey data of the 1988 FEX will be ready for calculation in September 1989 and published in December. But those results that use register data cannot be produced before March 1990. By that time personal identity numbers and other indentifying information will be removed from the files. It will not be possible any more to identify a person who took part in the survey.

4 ESTIMATION AND PRECISION

Using an srs of individuals for a family survey is the equivalent of assigning each family a sampling probability that is almost proportional to the number of family members included in the sampling frame. Since expenditures for food, housing, clothing, and furniture on average increase together with the family size, this sampling design was fairly efficient for several though not all types of expenditure. Recreation is an example of an expenditure that is not increasing with family

size. Experiences have demonstrated that this design also gives a useful distribution of the sample on important domains of study.

The expenditures for each family are inflated to yearly estimates. The yearly estimates are then weighted with the sampling probability for each household. Finally, poststratification is used. Its aim is primarily to reduce the nonresponse bias in estimates by compensating for nonresponse rates varying between poststrata.

Calculations on the 1978 FEX indicated that poststratification reduces the standard errors of the estimated total expenditure with two to four per cent, as seen in Lindström and Lundquist (S:1985) and Lundquist (S:1986). The reduction is small as already the sampling of families with probabilities proportional to their size (pps) is pretty efficient. It is estimated to reduce the variance for the estimate of all expenditure with 25%, for food with 35% and for housing costs with 15% compared to the variance at an equalsized hypothetical srs of families.

Probably the poststratification in the 1988 FEX will be, for the most part, the same as in the 1985 FEX. A study of the variation in nonresponse rates and in averages in the 1985 FEX led to the use of 45 poststrata defined by family size, region, and age of the head of the family. The size of each stratum had been calculated from the sampling frame. Totals were more affected than averages and other ratios.

Due to the simplicity of the sampling design, the precision of averages and totals can easily be calculated for the sample as a whole and in domains of study. These calculations are done by computer programs developed for in-house use. In table 2 the 1985 FEX coefficients of variation (cv) for averages and important aggregates of expenditure are reported.

Table 2 Cvs for means per family and year in 1985 FEX

Aggregate	Coefficient of variation (%)
All expenditure	0.80
Food	0.75
Non-durable goods and footwear	2.57
Dwelling	1.01
Furniture and household articles	2.99
Health- and medical care	3.89
Transportation	2.04
Recreation etc.	1.43
Spirits and tobacco	2.01

The 1988 FEX was designed to produce the same level of precision as the 1985 FEX. Except for all expenditures and

very regular expenditures like food, the cvs from the 1978 FEX were about 80% of those given in the table.

The cv of the average (\bar{x}_g) in a domain of study, g, could be approximated with some positive bias according to the formula

$$cv(\bar{x}_g) = \sqrt{n/n_g} * cv(\bar{x})$$

where $cv(\bar{x})$ is the all sample cv, n the all sample size and n_g the sample size of the domain of study. The calculations are reported in Lindström and Lundquist (E:1989)

Some attempts have been done to estimate the effect on the precision when the response burden was reduced by shortening the diary period from four weeks to two weeks. For estimates based only on diary information this effect has been estimated for some categories of expenditure and is presented in table 3.

Table 3 Increase of cv when length of diary period is reduced from four weeks to two weeks - in per cent.

Expenditure	1985 FEX	1969 FEX
Food	9	13
Restaurant meals	22	
Clothing and shoes		Clothing 50 Shoes 36
All diary expenditure	24	39

A reduction of the diary keeping period has different effects on the precision of each aggregate. The most extensive study on this is Lindkvist, Lindström and I Lyberg (S:1978). The effects depended on how the expenditures are correlated in time. The loss in precision was less among more frequent expenditures and greater among less frequent expenditures. If a shorter period for diaries was chosen and the desired level of precision still was to be retained, the sample size must be substantially increased.

A few calculations in the 1969 FEX gave examples of standard errors for one month diaries varying from 1.5 (paintings) to 3.2 (carpets) times those of the same expenditure measured in all the year intervju.

5 DATA PROCESSING, EDITING AND CODING

Editing and coding is done continuously during the year. The interviews and the diaries are registered and checked by a group of four persons who also do the manual coding of socio-economic group. Records are checked for completeness and consistency and duplications are deleted. Notations which do not conform to the instructions are corrected. Since the interviewers already have checked the questionnaires and diaries, very few callbacks are necessary.

Logic and value controls are done on the mainframe computer. How automated coding of expenditures was introduced in the 1978 FEX is described by L. Lyberg (1978). A preliminary coding rate of 0.56 could be increased to 0.66. The reporting of all kinds of food as one aggregate and other aggregating together with the use of preprinted headings (see section 6.5) reduced the number of codes from around 700 in the 1978 FEX to around 225 in the 1985 and 1988 FEXs. This led to an increase of the automated coding rate to just below 95 % in the 1988 FEX. For about 65% of the expenditures, the headings allow complete automated coding. For the remaining 35%, the more detailed description supplied by the families must be used and the automated coding rate is just above 80%.

Complete files are delivered to the Survey Research Institute where large expenditures and expenditure of specific codes are listed and scrutinized. For farmer's housing costs and benefits like the use of a company car calculated values are imputed for the family. Finally, the expenditures are aggregated in a way appropriate for further processing. The expenditures of each family are weighted to the level of yearly expenditures for every aggregate. Other weights are then used to adjust for the varying sampling probabilities, poststratification, and variation in response rates between poststrata.

Estimates of averages among families, totals, and the distribution of expenditures are now calculated as are the precision for some aggregates and domains of study. For some goods like "clothing and shoes", averages are also calculated for groups of individuals. Calculation of other types of estimates like variations within the year, the distribution of expenditures by size, and other analyses will often require the complete tapes for processing. There has, however, not been a great demand for such calculations.

In the 1978 FEX, an ambitious effort was made to reconcile reports when the reported level or composition of expenditures seemed to be unreliable. This effort resulted in very few corrections. Families insisted that they had reported correctly and that special circumstances explained the deviant values.

In other contacts too, the reporting families insisted that they, on the whole, had followed the instructions. In the 1985 FEX, 306 families (out of a subsample of 356 responding families) completed a questionnaire on survey participation. Ninety per cent said that they started their diaries on the requested day. One half of the respondents recorded their expenditures on the day of purchase and the other half recorded their expenditures sometimes on the day of purchase, sometimes a few days later. Only 10% thought that their expenditures had been influenced by participation in the survey. Very few found any difficulties in performing the actual reporting. Only 17% had to ask the interviewer for advice.

6 THE EFFECTS OF CHANGES IN THE RESPONSE BURDEN

6.1 RESPONSE BURDEN AND WAYS TO REDUCE IT

Compared to other sample surveys at Statistics Sweden, FEX puts a heavy response burden on the respondents. The preliminary interview combined with the instructions for the diary keeping takes about one hour. The diary keeping last four weeks. There is one main diary which is filled in by the person who has the major responsibility for the family's expenditures and there are additional books for everyone aged 13 and over. In average a family reports between 100 and 110 cases of expenditure in the introductory questionnaire and the four weeks diary together. Diary keeping is estimated to take about five minutes each day. Some families who refuse to participate probably do so because of the length of the commitment, not because of the total effort required of them.

It is important that the response burden does not discourage the families. The crucial thing is to make them start in the survey. Very few give up once they have started and very few can be persuaded to participate by being offered a shorter period of diary keeping if they have refused once.

In order to encourage the sampled families to participate, the importance of the survey is stressed to them in different ways and several measures are taken to reduce the response burden. Most important are:

- Allowing the diary period to be postponed
- Reducing the amount of requested information
- Use of preprinted diaries
- Use of register information

The size of response burden has an effect not only on the response rate but also on the data quality in the completed diaries. This has also been studied in experiments and evaluations in order to design the surveys to secure as good data quality as possible.

When different data collection methods are compared the one that produces most reporting of expenditure is believed to be the best and is preferred. We believe that forgetting to report expenditures is a greater problem than the reporting of fictitious expenditures or telescoping. In a small subsample of 306 families among the respondents in the 1985 FEX, several admitted that they had forgotten to report expenditures some time, 31 per cent that they had forgotten some small expenditure, five per cent admitted underreporting due to temporal absence from home and two per cent due to illness. Only two per cent said that they got tired of keeping diaries. That the FEXs totals are smaller than those of the National Accounts also supports the idea. Our experience is that when one method is better than another to increase the response rate then it will also give a larger number of recorded expenditures.

6.2 POSTPONING THE DIARY PERIOD INCREASES THE RESPONSE RATE

Sometimes it was not possible to make the families fill in their diaries during their sampled period. To avoid nonresponse, the interviewer could allow the family to postpone its diary keeping but not more than one month. This can be regarded as a reduction of the response burden if the family is busy for some reason during the sampled period. The impact of this measure on the response rate is shown in table 1 of section 3.

It is obvious that postponing the diary period can introduce bias into the estimates. If for example, a responding family did not fill in its diary during its sampled period because of vacations and traveling, then expenditure for i.e. sports equipment, travels abroad and restaurant meals might well be underestimated but other more regular expenditure be overestimated. Still, the information from the introductory interview, i.e., the classification of the family and about 40 % of the estimated all expenditures would not be affected by the delay, and thus it is better to postpone the diary keeping than to have nonresponse.

In 1985 about one of seven responding families could be persuaded to participate only when it was allowed keep its diaries in a later period than the sampled. The corresponding rate will be almost the same in the 1988 FEX.

In the 1978 FEX, the interviewers were instructed to find out why the families with postponed diary periods did not accept the sampled period. The results were not very informative. In 25% of the cases the family was not contacted in adequate time, but it was not established

why. About 30% provided no reason. The rest mentioned reasons (ordered by decreasing frequency) like "away from home", "much to do at work", "someone ill at home", "some family member absent", and "change of residence" during the period.

6.3 REPORTED EXPENDITURE AND RESPONSE RATE DECREASE WHEN THE RESPONSE BURDEN INCREASES

As nonresponse rates had increased in continuing surveys during the seventies there was every reason to believe that the nonresponse rate in the 1978 FEX would be larger than in the 1969 FEX too if nothing was done to reduce the response burden. It was then suggested to divide it on two independent sample. One sample would report all expenditures during a short period (complete diaries). A second sample would report only expenditures amounting to 50 SEK and more but during a longer period (partial diaries). Five levels of response burden were tried in an experiment in 1976. The sample size was 40 families for each combination and the outcome of the experiment is presented in table 4.

Table 4 Response burden and response rate in 1976

Sample	Complete diaries	Partial diaries	Response
A	2 weeks	-	.65
B	-	4 weeks	.78
C	-	8 weeks	.75
D	2 weeks	4 weeks	.60
E	2 weeks	8 weeks	.60

We concluded that a combination of two independent samples and methods A and C should be used in the 1978 FEX. Method C was rejected since there were indications that reporting was seriously waning during the last weeks.

It was calculated that the combination of samples would limit the response burden, secure low nonresponse rate, and give a good precision for all the major aggregates of expenditure. In one sample (complete diaries sample) about 5800 families were asked to report all expenditures for two weeks and take part in an interview for specified large expenditures. In the other sample (partial diaries sample) about 7700 families were asked to report only those expenditures that amounted to 50 SEK or more but for a four week period. In both cases there was an introductory interview.

Response rates were different for the two samples; 72% for the complete diary sample and 80 % for the partial diary sample. Nevertheless, the distribution of the

respondents according to family type, population density area and sociodemographic variables was almost identical for both samples. We could not detect any distortion in the distribution of the sample on these domains of study from the 10 % difference in nonresponse rate. As an example, the response rates in families by size are given in table 5.

Table 5 Reponse rate by registered* family size

Family Size	1	2	3	4	5	>6	All
Complete diary	.66	.68	.76	.80	.79	.82	.72
Partial diary	.74	.76	.83	.87	.89	.86	.80
Difference	.08	.08	.07	.07	.10	.04	.08

* According to the RTP but sometimes smaller than the actual family as defined by FEX.

In average the partial diary families reported 20% more expenditures per week above 50 SEK than the complete diary families but the estimated totals were also 20% higher. The greater reporting of expenditures over 50 SEK for the partial diary sample affected the totals and averages. Addition of the partial diary sample increased the estimated total of all expenditure by 3% compared to when only the complete diary sample was used.

The same tendency was also seen in the 1969 FEX where one sample kept complete diaries during one month (all expenditures) and partial diaries (expenditures amounting to 25 SEK and more) for the two following months. During the second and the third months the families reported 10% more expenditures above 25 SEK than when they kept complete diaries.

6.4 THE AMOUNT OF REPORTED EXPENDITURE DECREASES DURING THE DIARY PERIOD

The impact of the length of the period for diary keeping has been evaluted in three cases. It is a well-known fact, for example reported by Des Raj (E:1972), and also our experience that the number of reported expenditures continues to decrease during the period. Less expenditure is reported for each week. The decrease is most important in the beginning of the period but goes on all the time.

In two early surveys the distribution in time of the expenditures for food was studied by an anonymous author at Statistics Sweden (S:1966). The results given in table 6 show a different level in the first and the second part of the studied period.

Table 6 Food - Reported expenditure per week and family

	First week	Second week	First/Second
1951			
Farmers	111	101	.91
Others	87	82	.93
1952	76	70	.92

In the 1969 FEX the month of complete diaries was divided into two halves whose estimated level of total expenditures were compared with each other. For three parts of each half of the months the all year expenditures were estimated. Table 7 that is taken from Kjellegård (S:1972) shows how much less expenditure is reported during the later half of the month. The calculations were also made for expenditures at different levels with mainly the same result for all price classes.

Table 7 Estimated all expenditure - in first and second half of the diary month. Million of SEK.

Days number	First half	Second half	First/Second
1 - 3	2400	2000	.83
4 - 7	1800	1700	.94
8 - w	2077	1979	.95
1- w	2073	1901	.92

As the length of the period was one month w could be 15 or 16. Seasonal variations are eliminated when the first and second halves are compared but not between days 1-3, 4-7 and 8-w.

This effect of "decreasing reports" was evaluated more in detail by Lindkvist and Lindström (S:1980) on the 1978 FEX for a few expenditures ("clothing" and "furniture and carpets") where the partial diaries were kept. The simultaneous distribution on weeks and price classes of reported expenditures for clothing is given in table 8.

The weekly decrease is evident for both complete and partial diaries and strongest from the first to second week. However, for both samples the distribution on price classes varies very little between the weeks. The decrease seems to be equally distributed over all price classes. When the distributions for complete and partial diaries are compared, one can suspect that the high frequency for the lowest expenditure classes among those who keep

partial diaries is the result of their having added together several smaller expenditures in order to have something to report. For expenditures on "furniture and carpets", there was no such obvious difference in the distribution of price classes between partial and complete diaries.

Table 8 CLOTHING - expenditures distribution on week and price class (in SEK), per cent.

Price class	50-75	76-100	101-150	151-200	200-	All
Complete						
First	16	13	11	7	6	54
Second	14	11	10	7	5	46
Both	30	24	21	14	11	100
Partial						
First	12	6	7	4	3	31
Second	9	5	5	3	3	25
Third	8	5	4	3	2	22
Forth	7	5	4	3	2	21
All four	36	23	18	12	11	100

6.5 PREPRINTED HEADINGS INCREASE THE NUMBER OF REPORTED EXPENDITURE

In the earlier FEX surveys, all expenditures were reported in the same sequence as the purchases were made. As Sudman and Ferber (E:1971) and other studies had indicated that preprinted headings would increase the number of reported expenditures - probably by acting as a memory support - we found it useful to apply the method to the Swedish survey.

In 1983, a Swedish experiment compared diaries with preprinted headings with three types of diaries for current reporting. There were 14 headings like "food", "tobacco", "lottery tickets", "furniture" etc and one heading "others". Lindkvist and Lundgren (S:1984) report that preprinted headings resulted in about 5 per cent (not significantly) more reported cases of expenditure than the current reporting as is shown in table 9.

The effect was of the same size when corrected for family size. It was mainly the same in an urban area (province of Göteborg) and in rural and small town areas (provinces of Gävleborg and Värmland). The nonresponse rate in the experiment was about 70 per cent - almost the same for the preprinted questionnaire and the others.

Table 9 Average number of expenditure in four weeks diaries.

Type of expenditure	Urban area		Rural area	
	Headings	Current	Headings	Current
Food	21.6	23.3	23.8	23.8
Spirits and tobacco	6.9	5.8	4.7	4.2
Non-durable goods	19.5	15.9	16.2	14.9
Clothing	6.1	6.4	6.7	6.2
Furniture	2.8	1.8	1.8	1.7
Transportation	4.3	2.8	4.0	2.5
Leisure	9.3	9.2	9.0	8.6
Other	12.1	13.0	10.9	8.4
Total per family	82.6	78.1	77.2	70.2
Total per individual	31.8	25.9	27.6	20.9
Number of families	28	83	26	78

The outcome of the experiment was considered as favourable to the use of preprinted headings and it was decided that the method should be used in the 1985 FEX. Use of headings also made it easier to give specified information on certain types of expenditure and made coding easier. Since there was a reduction of funds for the 1985 FEX it was a good thing if the number of contacts between interviewers and the families could be reduced. It was also advantageous that use of preprinted headings reduced the number of written instructions needed. As the method worked well in 1985 it was also used in the 1988 FEX.

6.6 USE OF REGISTER INFORMATION IMPROVES DATA QUALITY

With permission given by a certain authority (the Data Inspection Board), register information supplements the sample survey data. The FEX uses mainly register data on taxable income (including pensions and insurance payments) and social security. This results in a substantial reduction of the response burden and gives reliable information on income. The information has been improved for each survey but is not fully complete even in the 1988 FEX. It is important to have access to it since it permits an evaluation of the level of expenditures. There are still no estimates on how much use of register information means to reduce the interviewing time and to increase the data quality.

7 COMPENSATION/INCENTIVES AND THEIR EFFECTS

7.1 COMPENSATION AND THE REASONS TO USE IT

The Family Expenditure Survey is the only survey in which Statistics Sweden offers incentives or compensation to the respondents. Compensation is offered to encourage sampled families to participate. As a rule the compensation is given only when the survey is completed.

There is a lot of empirical support for the idea that the use of compensation increases response rates, for example reported by Sudman (E:1971). Anyhow, nobody seems to know exactly why it does so. It has not been established whether the interviewers feel more confident and do a better job or whether reluctant families are encouraged to cooperate or whether some other forces are at work. It is very hard to analyze the decision taken by a particular family. In the 1975 FEX experiment the interviewers were asked to judge which families were made to cooperate by the promised compensation. They supposed that they only could identify two such families among 71 respondents with compensation.

We are sufficiently convinced that incentives or compensation is vital to maintain an acceptable level of data quality and have chosen not to conduct further experiments on compensation per se. The problems that we will now concentrate on are the choice of the type of compensation and the monetary value of the compensation.

The compensation in the 1969 and 1978 FEXs was given in cash and worth about 60 USD in 1988 price level. The need to reduce costs in the 1985 and 1988 surveys was one reason that the value of the compensation was reduced. We also believe that the fact that compensation is offered is more important than its monetary value. To find the best type of incentives, a sample of 1000 persons was interviewed. Twenty per cent of the respondents in the sample said that no compensation was necessary. Among the rest, there was a slight dominance of those who preferred lottery tickets over those who preferred the value of a lottery ticket in cash or an analysis of their own expenditures. In 1985 and 1988, the compensation was limited to lottery tickets, subscription for a paper and other presents worth in all about 10 USD. The main part of it is distributed only when the diaries are completed.

7.2 COMPENSATION INCREASES THE RESPONSE RATE

Two experiments on the effects of compensation - after the diaries had been completed - on the response rate have been performed at Statistics Sweden. In both cases the sample size was just above two hundred families randomly distributed on control and experimental group. In 1965

the response rate was 7 per cent higher for diaries during one month among those who were compensated with 60-80 SEK. When the refusers were offered to do their diaries for just one week the difference was reduced to three per cent. Those who had compensation also returned their diaries faster than those who had not .

In 1975 a four factor experiment ended in a difference in response rate of 9 per cent to the advantage of compensation varying between 50 and 100 SEK. Some of the families were given four weeks diaries but others just two weeks to make deeper analysis possible. The number of reported expenditures was also measured and was significantly higher among the families with compensation. On average, seven more cases of expenditure were reported per week and family when compensation was paid.

7.3 INCENTIVES IN ADVANCE ARE USEFUL

In FEX 1988 it turned out a few month after the start of the data collection that the response rate would be far below the expected level between 70 and 75 per cent. Yet, this survey had almost the same design and compensation to the respondents as the 1985 FEX. To some degree, the decrease was explained by the total workload on the interviewers being very heavy during 1988.

It was then necessary to make every possible effort to increase the response rate. The interviewers were given more support, the FEX was given priority to other surveys, improved information was produced and the compensation increased. Each sampled family in the remaining part of the sample was given a pocket calculator together with the mailed information and without any obligation. Small gifts given before the data collection have in several studies been reported by Berk et al. (e.1987) to have a good effect on the response rate and was instituted in the survey as fast as possible.

A built-in experiment was conducted so the effect of the incentive could be separated from the other efforts to increase the response rate. An experimental group consisting of about 460 families selected from the regular sample, was given calculators and compared with an equal-sized group not given calculators but sampled to fill in their diaries during the same period. The experiment was done although it was obvious that use of a control group not given calculators would reduce the possible improvement of the final nonresponse rate.

The experiment is still not finally evaluated. However within one month after the contact was taken with the families the response rate was about seven per cent higher among the experimental group that got the pocket calculator, then among the control group. All the efforts

together seem to have increased the all sample response rate with about five per cent. Still 65 % response rate is at least five per cent below what was expected.

8 EVALUATION

The estimates of the 1985 FEX have been compared with other statistics in order to evaluate the survey results. Comparisons have been made with the population statistics, the National Accounts (NA) and the Census in 1985. There are possibilities still not utilized to do a more detailed evaluation.

The estimated number of individuals is one percentage point less than that given by the population statistics. Some difference should also be expected since the populations are not identical. FEX excludes persons in institutional homes. The number of families with at least one member younger than age 75 was estimated at 3,430 thousands by the 1985 FEX and 3,310 thousands by the 1985 census. The difference may depend on different definitions, uneliminated nonresponse effects in the FEX and different measurement techniques.

The 1985 Census uses mailed questionnaires and evaluation of other Swedish surveys has demonstrated a tendency for couples living together but not being married to report as two families instead of one, when they answer to mail surveys. In FEX which makes an interview at home this error will take place less frequently. The FEX estimate might well be the better one. The number of families with children (age 18 and younger) was estimated at 1,055 thousands by FEX and 1,051 thousands by the census which is encouraging as one important aim of the survey is to establish the living conditions of those families.

The estimated total expenditures were nine percentage points lower than the corresponding calculation in the unadjusted national accounts. Examples are given in table 10. Differences were specially large and unsatisfying for subaggregates of "furniture and leisure articles". Exact agreement is, however, not expected as FEX and the national accounts do not have the same definitions. Both systematic and random errors can appear in the national accounts as well as in the FEXs.

Comparison on a more detailed level demonstrated sometimes a good agreement as for "food", "shoes", "books and papers" etc., sometimes differences that can be explained as for "dwelling", "household machinery", "private cars and other vehicles" etc. Unexplained and unsatisfying differences appeared for "clothing", "furniture", "household goods" and "leisure articles".

Table 10 Expenditures in 1985 FEX and National Accounts
milliards SEK

Expenditure	FEX	NA	FEX/NA
All	397	438	.91
Clothing and shoes	296	231	.92
Furniture&household goods	258	278	.93
Medical care	683	714	.96
Transportation	600	705	.85
Leisure	320	390	.82
Assorted..	406	350	1.16
Travels abroad	951	661	1.44

The estimated average expenditure was about 21 percentage points above the estimated average income in 1978 and 7 percentage points above the estimated average income in 1985. The improved agreement in 1985 is due to the use of additional and better register information. The direction of the difference indicates that underreporting is not a very important source of error. Furthermore, some differences between the estimated average income and the estimated average expenditures are to be expected since lottery returns, monetary gifts, inheritances, and borrowed money will add to the income without being recorded by FEX. The difference goes in the same direction in all domains of study. It is specially large among enterprizers and farmers but not easily explained in these groups.

9 SUMMARY

This report describes the Swedish 1988 Family expenditure survey and how the experiences gained in a series of experiments and evaluations have influenced its design and expected quality. Variations in the FEX design obviously have an effect on the results. Choice of measurement method, the level of the response burden and the use of compensation to sampled families have an effect on the response rate and the level of reported expenditures in surveys of family expenditures.

The levels of the estimates are also influenced by the length of the diary keeping period and by the choice between use of diaries, interviews and in a few cases register data. Experiments and evaluations have demonstrated that compensation results both in higher response rates and an increase in the number of reported expenditures than if compensation had not been offered. Prepaid compensation, even if somewhat nominal, also increased the response rate.

By use of experience from former surveys we could be confident that the precision of the 1988 FEX would be

rather close to the level it was designed to reach. The precision of the survey will also be easily estimated. On the other hand, the nonresponse rate has been high in all FEXs and increased above the normal level in the 1988 FEX. The distribution of the nonresponse was systematic at least for household size and population density area. Although the nonresponse is compensated for in the estimation phase of the survey and the compensation is believed to be partly successful, the increased nonresponse level requires a scrupulous evaluation.

Measurement errors present another and possibly greater problem than nonresponse. Their size is not easily quantified. Nevertheless, attempts to evaluate the results of the FEXs by comparing them with income statistics, census statistics and the national accounts have only in a limited number of cases yielded differences that could not be explained with reference to various populations or definitions. In some cases we insist that FEX gives the more reliable results.

For the survey to come in 1991 or 1992 there is a need for further experimentation and evaluations. The design will probably have to be altered again. There are two main reasons for this. One reason is that the response rate should be increased. The other is that the FEX in some way will be coordinated with the Family Income Survey. Use of some kind of computer assisted data collection has been discussed but we do not think that it is time yet for the FEX to introduce any completely new technique for data collection.

10 REFERENCES

10.1 REFERENCES IN ENGLISH

- E:1 Bershead, M.A. and Tepping, B.J. (1969), "The Development of Household Sample Surveys," Journal of American Statistical Association, (JASA) vol 64, no 328, 1134-1140.
- E:2 Berk, M.L., Mathiowetz, N.A., Ward, E. P. and White, A.W. (1987), "The Effect of Prepaid and Promised Incentives: Result of a Controlled Experiment," Journal of Official Statistics, 1987:4, 449-458.
- E:3 Biörn E. and Jansen E.S. (1980), Consumer Demand in Norwegian Households 1973-1977. Oslo, Statistisk Sentralbyrå, Rapport 80/4.
- E:4 Des Raj (1972), The Design of Sample Surveys, McGraw-Hill, New York.
- E:5 Kemsley, W.F.F. (1979), Collecting Data on Economic Flow Variables Using Interviews and Record Keeping, The recall Method in Social Surveys, Edited by Moss-Gold-stein, Studies in Education 9, University of London, Institute of Education, London.
- E:6 Kemsley, W.F.F., Redpath, R.U. and Holmes M. (1980), Family Expenditure Handbook. London, Office of Population Censuses and Surveys.
- E:7 Lindström, H. and Lundquist, P. (1989), Application of variance functions in the Swedish 1985 Family Expenditure Survey. To appear in R&D report, Statistics Sweden.
- E:8 National Household Survey Capability Programme. (1982), New York, United Nations Department and Techniquial Cooperation and Statistical Office
- E:9 Pearl, R.B. (1979), Reevaluation of the 1973-72 US Consumer Expenditure Survey. Washington, U S Department of Commerce, Bureau of the Census, Techniquial Paper No 46.
- E:10 Pearl, R.B. (1968), Methodology of Consumer Expenditure Surveys, Washington, U.S. Department of Commerce Bureau of the Census.
- E:11 Private Consumption Expenditure and Price Index Numbers for the Netherlands 1951-1977 (1982), The Hague, Central bureau voor de statistiek, Statistical Studies no 33.

E:12 Sudman, S. and Ferber, R. (1971), "Experiments in Obtaining Consumer Expenditures by Diary Methods," JASA, vol 66, no 336, 725-735.

10.2 REFERENCES IN SWEDISH

- S 1 Ej angiven författare (1964 : Redovisning från HBU:s provundersökning 22-28 november 1964. SCB, stencil, 1964-12-15.
- S 2 Ej angiven författare (1965) : Hushållsbudgetundersökningen 1967 - Redovisning av resultat från provundersökningen i maj 1965 angående hushållens inkomster och sparande. SCB, stencil, 1965-08-10.
- S 3 Ej angiven författare (1966) : Undersökning av delmomenten inledningsintervju, bokföring och tremånadersintervju inför nästa hushållsbudgetundersökning. SCB, stencil, 1966-08-04.
- S 4 Ej angiven författare (1966) : Undersökning av tillförlitligheten i uppgifter om konsumtionen av vissa varaktiga konsumtionsvaror inhämtade genom intervjuer. SCB, stencil, 1966-08-12.
- S 5 Jonsson, L. (1955) : Några metodprövningar för levnadskostnadsundersökningar. Sociala Meddelanden 1955:2
- S 6 Kjellgård, P. (1972) : Preliminär beräkning av konsumtionsskattningar i olika perioder av en bokföringsmånad. SCB, stencil, 1972-11-21.
- S 7 Kjellgård, P., Lindkvist, H. och Lindström, H. (1982) : Hushållsbudgetundersökningen 1978 - teknisk rapport. MIHS 26.
- S 8 Kungl. Socialstyrelsen (1956) : Levnadskostnaderna 1952 SOS.
- S 9 Lindkvist, H. (1969) : En jämförelse mellan månads- och tvåmånadsbokföringen i HBU-69. SCB, stencil, 1969-11-21
- S 10 Lindkvist, H. och Lindström, H. (1972) : Teknisk rapport avseende hushållsbudgetundersökningen 1969. SCB, stencil, 1972-10-17.

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- intern serie vid I/UI.

- S 11 Lindkvist, H. och Lindström, H. (1980) : Jämförelse mellan fullständig och förenklad bokföring i HBU 1978. MIHS* 18.
- S 12 Lindkvist, H., Lindström, H. och Lyberg, I. (1976): Hushållsbudgetundersökningen 1978 - teknisk rapport avseende provundersökningen 1975. SCB, stencil, 1976-02-25.
- S 13 Lindkvist, H. och Lundgren, L. (1984) : Hushållens utgifter - provundersökning hösten 1983. SCB, stencil, 1984-04-13.
- S 14 Lindström, H. (1981) : Studier av datakvalitet i undersökningen av privathushållens konsumtion. SCB, Rapport från SCBs forskarkonferens i statistisk metodik - Datakvalitets problemen inom ekonomisk analys och ekonomiska modeller, sid 215-228.
- S 15 Lindström, H. och Lundquist, P. (1985): En explorativ genomgång av variationerna i bortfallsfrekvens och utgiftsnivå i hushållsbudgetundersökningen 1978, stencil.
- S 16 Lundquist, P. (1986): Kompensationsvägning och variansreduktion vid hushållsbudgetundersökningar, Examensarbete vid Uppsala universitet, U.U.D.M. project report 1986:4.
- S 17 Lyberg, I. (1977) : Hushållsbudgetundersökningen 1978 - resursfördelningen på uppgiftsinsamlingsmetoder. SCB, stencil, 1977-07-29.
- S 18 Lyberg, L. (1978), Automatisk kodning i HBU 1978,
- S 19 Lyberg, L. (1980) : Bortfallsarbetet under 1978 års Hushållsbudgetundersökning, MIHS 12.
- S 20 Lundgren, L. (1980) : Ekonomibarometern - utvärdering av projektet "Utveckling av löpande hushållsbudgetstatistik" samt förslag till ny statistik. SCB, stencil, 1980-04-22.

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