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PREFACE

This report is the result of a project assigned by Eurostat and the EFTA Statistical Secretariat to Statistics Netherlands and Statistics Norway, respectively. The theme of the project, viz. the use of information on birth expectations in population forecasting, is one of the many issues taken up by Eurostat's Working Party on Demographic Projections. Population forecasters working in statistical agencies in the 19 countries of the European Union and the European Free Trade Organisation assemble in this Working Party. Its activities centre around a programme for co-ordination of national population forecasts in Europe. Through co-ordination, exchange of information, and cross-national research the Working Party's aim is to improve the quality of these forecasts.

We are grateful to the members of the Working Party for providing us with the information on which this report is based. Discussions with Harri Cruijsen, Joop de Beer, and Turid Noack during various stages of this project , and comments made by Erik Klijzing are gratefully acknowledged.

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1. PROBLEM FORMULATION AND SCOPE

1.1. The need for birth expectations in population forecasting

An important factor contributing to the reliability and accuracy of national population forecasts is the component of fertility. The other two components of change, viz. mortality and international migration, generally have less impact on the quality of the forecasts. Mortality is relatively stable, and therefore quite easy to extrapolate. Moreover, uncertainty connected to this component only applies to its tempo (at what age do people die?), not to its quantum (since everyone dies, the quantum of mortality is 100 per cent by definition). International migration as such is difficult to extrapolate. Socioeconomic, political and legal developments, both in the countries of origin and destination, have caused considerable irregularities in this component. However, the demographic development in most receiving countries is hardly influenced by international migration. The reason is that the numbers involved are small compared to the population already present in the country, at least in most countries of the European Union and the European Free Trade Organisation, on which this report focuses.

The relative importance of the fertility component for the quality of population forecasts at the national level explains why relatively much attention has been given to that component in the past. A second reason has been the rapid fall in birth rates observed in the 1960s and 1970s in many western countries. Virtually all forecasters were taken by surprise by that development, and various methods have been used to try and improve the fertility extrapolations needed for population forecasts. Various methods are in use nowadays, but most of them are a more or less sophisticated form of time series analysis (Cruijsen and Keilman, 1992, 19).

One method that statistical agencies relatively seldom employ when preparing fertility assumptions is using information about childbearing intentions as expressed by women in the childbearing ages. Asking women about their expected, ideal or desired number of children is more or less routine in modern family and fertility surveys[1]. But the information thus obtained cannot be used directly in population forecasting for various reasons. Previous research, to be reviewed in Section 1.2, has shown that childbearing intentions often reflect current norms rather than intended future behaviour. This implies that in times when fertility developments are unstable, women may underestimate or overestimate their future births to a considerable degree. Moreover, the family and

[1] For instance, the core questionnaire of the family and fertility surveys currently coordinated by the Economic Commission for Europe (Population Activities Unit) includes questions on childbearing intentions. However, the issue has also been taken up in earlier surveys, for instance the World Fertility Surveys (Berent 1983).

childbearing situation of a particular woman may change over time. Most women living with a partner in a stable relationship will not explicitly take the possibility of a break-up of the union into account - yet this occurs quite often in reality, and such an event will generally have a downward effect on the number of children the woman will have had at the end of her childbearing period. Another factor is that young childless women who have postponed childbearing may be unaware of the possibility that they will be sub-fecund at more advanced ages, when they want to become pregnant.

These factors explain why information about childbearing intentions cannot be used straightforwardly in population forecasts. Methods have to be devised that adjust the information collected in a survey. Only a few countries have used such an adjustment method. Examples are the United Kingdom and the Netherlands (Van de Giessen, 1992). An obvious question is whether these or other methods may also be used by other countries, who have information regarding childbearing intentions, but do not base their fertility forecasts on this information.

Thus the purpose of the current project has been to analyse existing approaches for including birth expectations data in fertility forecasts. A further aim has been to recommend an approach that may be used more generally in a large number of countries.

The analysis is limited to post-war generations of women, with an emphasis on younger cohorts. The project covers the 19 countries represented in Eurostat's Working Party on Demographic Projections[2], to the extent that data on birth expectations collected in one or more nation-wide representative surveys are available. Thus a more narrow problem description is the following: "Devise a method that statistical agencies who are members of the Working Party on Demographic Projections can use when they want to incorporate information about childbearing intentions in their fertility forecasts".

1.2. Review of previous work

A useful review of the literature on birth expectations has been given by Van de Giessen (1992). We will only briefly summarize the main points here and supplement Van de Giessen's review when necessary.

[2] The 19 countries are Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom. A questionnaire was also mailed to the Bureau of the Census in the USA. This country has a relatively long record with respect to the use and analysis of fertility intentions. Therefore it was natural to include that country in the project.

The unreliability of birth expectations, compared with actual births in later years, has often been documented and needs not to be repeated here (Westoff and Ryder, 1977; Noack and Østby, 1985; Van de Giessen, 1991). In particular, expectations for the short run (up to five years ahead, say) frequently overestimated future births. Most of the empirical evidence for these findings was collected in the 1960s and early 1970s, when fertility was falling rapidly. Later surveys, carried out in times when fertility trends were more stable than in the previous decade, show much less overestimation (Hendershot and Placek, 1981; Shaw and Statham, 1981). It looks as if the expectations reflect prevailing norms at the time of the interview, rather than indicating future behaviour (Westoff, 1981). No analyses have been published on the basis of data for the second half of the 1980s, when women caught up delayed childbearing in a number of countries, and period fertility went up.

At the aggregate level, overestimations are partially compensated by underestimations, at least in times of falling fertility. Hence the reliability of birth expectations at the individual level is less than that at the aggregate level (Westoff, 1981; Noack and Østby, 1985; Van de Giessen, 1992). In the end, population forecasters are interested in aggregate fertility indicators, for example completed cohort fertility, or the percentage childless of recent cohorts. This means that aggregate expectations are of primary importance here. (But in order to understand the reasons for possible over or underestimations it may be useful to analyse individual cases as well.)

Non-response is an important issue in the analysis of birth expectations. One may distinguish between item (partial) non-response and case (complete) non-response. An example of item non-response is a woman who answers "don't know" to the question about the number of births she expects to have in the future. Morgan (1982) concludes that "don't know" responses need not be treated as missing data, but instead are both valid and meaningful responses. Eliminating these uncertain responses would distort comparisons in expectations across surveys, due to shifts in aggregate uncertainty. Moreover, the likelihood of accurately detecting shifts in fertility expectations would be reduced.

Case non-response may distort representativeness. A common finding is that childless women are less likely to respond than mothers, see the references in Van de Giessen (1992). When non-response is caused by fecundity problems or by a negative view towards having children, non-responding women are likely to have relatively low birth expectations, and hence birth expectations for responding women will be biased upwards. Sometimes, weighting is used to adjust for this and other types (age, marital status, region of residence) of biases. In this case one assumes that responding women of the type that was underrepresented in the survey (for instance, young childless women in urban areas) have similar birth

expectations as women of that type who did not respond. Whether this assumption is justified is impossible to say.

Given the fact that birth expectations cannot be used at face value for fertility forecasting, various correction methods have been suggested. Frequently, expected completed cohort fertility is adjusted according to a number of factors, for instance age of the woman, or degree of uncertainty about future births (De Beer, 1991; Van de Giessen, 1992). Also various ways are in use to assign a certain number of additional future births to women who answered "don't know" to the question about expected births (Werner, 1986; Jain, 1988). A discussion of these methods is included in Section 4.1.

Morgan and Chen (1992) have analysed the usefulness of birth expectations data for predicting childlessness for American women. They consider data from the Current Population Surveys of 1980, 1983, 1985, and 1988. The proportions of white women aged 30-34 who expected to remain childless were between 11 and 14 per cent. However, these levels are much lower than the results on projected childlessness of three other methods they use, which result in levels between 22 and 27 per cent. Therefore they reject birth expectations data as a reliable source for projecting childlessness: many women who eventually remain childless reach that state via a series of decisions to postpone childbearing, rather than by deciding at a young age not to have children. Others do not take a deliberate decision, but experience problems with becoming pregnant, or they experience a break-up of their partnership. Thus Morgan and Chen conclude that only at higher ages, say 35, are childlessness intentions reliable. But because so few births occur past age 35, this information has limited value for projecting childlessness (p. 479). The authors are less sceptic towards using birth expectations for higher parities.

Calhoun and De Beer (1991) argue that birth expectations change over the life course of a cohort, as the women grow older and gain childbearing experience. Thus childbearing intentions depend, among other things, on age and parity. Moreover, explanatory variables should be taken into account. The authors test an econometric model which explains a woman's cumulated births and additionally expected births by socioeconomic and demographic background variables. They investigate the effects of age, work status, educational attainment, marital status, church attendance and whether the woman lives with a male partner. Data are used from the 1982 and 1988 rounds of the Netherlands Fertility Survey. Although they find that background factors significantly contribute to the dependent variables, the probability that the model has generated the data, as judged by the average (over all individuals) likelihood, is rather low (21-24 per cent). This indicates that important explanatory factors are not included in the model.

Noack and Østby (1985) did a record linkage study, in which birth expectations data from the Norwegian Fertility Survey of 1977 were linked to births information taken from the Central Population Register for the period 1978-1982 (five years). The advantage of such an approach compared with a panel approach is that drop-out hardly exists (indeed, about 97.5 per cent of the 4,137 women interviewed in 1977 were traced in the register; the remaining 2.5 per cent had been abroad for the whole period or parts of it, and no reliable information is available concerning their fertility behaviour). At the individual level, the findings by Noack and Østby confirm earlier findings, i.e. that there is only a limited correspondence between positive fertility expectations and later births. Not more than 55 per cent of the women who had stated in 1977 that they expected to have a or another child within five years actually did so in the period 1978-1982. When broken down into more specific time periods, the consistency between expectations and actual behaviour is even less (up to 38 per cent). At the aggregate level, the situation was somewhat better: 84 per cent of the children expected by the women in 1977 were actually born. But Noack and Østby conclude, on the basis of their findings, that "... fertility expectations will be highly doubtful predictors of future fertility." (p. 54)

1.3. Project outline

The project consisted of the following sub-tasks.

1. Collection, processing and analysis of information on birth expectations for countries represented in the Working Party on Demographic Projections.
2. An examination of methods currently in use for including birth expectation data in fertility forecasts.
3. Selection of a method that might be used as a common approach for the members of the Working Party on Demographic Projections.
4. Application of that method to those countries for which childbearing information is available.

1.4. The structure of this report

Chapter 2 presents the results of the inventory. Much of the information collected probes into family and fertility surveys which contain questions on childbearing intentions in the country concerned. Attention is given to such issues as the character of the sample, representativeness, and non-response in the survey (Section 2.2), the actual wording of the questions on future fertility (Section 2.3), and the time horizon for birth expectations (Section 2.4). Next we present a review

of current approaches for fertility forecasting used by the countries (Section 2.5), how birth expectations data are used in fertility forecasting (Section 2.6).

Chapter 3 discusses factors and theories that are relevant when judging the usefulness and the generality of fertility intentions. The individual overestimation of the future number of children is reviewed in Section 3.1, whereas Section 3.2 takes up the impact of non-response. The development of period fertility in the European Union and in the EFTA countries is highlighted in Section 3.3. Section 3.4 discusses the link between period total fertility rate, completed cohort fertility and the expected total number of children. Data on birth expectations have to be related to what we know about fertility developments from other sources. Section 3.5 looks at the age-period-cohort-problem, while we discuss fertility developments in Scandinavian countries in Section 3.6.

Chapters 4 and 5 focus on methods for using birth expectations data in forecasts. Chapter 4 reviews existing methods (Section 4.1), discusses evaluation criteria for these methods (Section 4.2), and proposes a simple method that can be used in the countries represented in the Working Party (Section 4.3). An application of this method for nine countries is described in Chapter 5.

Chapter 6 contains some conclusions and recommendations, both with respect to the issue of fertility intentions in future family and fertility surveys, and the use of information on childbearing intentions in population forecasting.

The questionnaire that has been used is contained in the appendix. Tables and figures can be found at the end of this report.

2. RESULTS OF THE INVENTORY

2.1. Questionnaire

In the summer of 1994 a questionnaire was mailed to representatives in the Working Party on Demographic Projections in the following countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom. Iceland and Liechtenstein, although formally a member of the Working Party, are not included in this list, because they do not take part in the activities of the Working Party. The US Bureau of the Census also received a copy, because of the tradition with analysis and use of childbearing intentions data in that country. Altogether 18 questionnaires were mailed, and the appendix contains a copy.

During the autumn of 1994, we received a reply from all of our colleagues. Denmark, Greece, Ireland, Luxembourg and Portugal informed us that no surveys with information on childbearing intentions are available. The Swiss fertility survey is currently in progress, and hence no information from this country could be obtained for the purpose of this project. In Belgium and France the questionnaire was forwarded to the CBGS and the INED, respectively. In the past, these institutes have organised a number of relevant family and fertility surveys.

Altogether we have at our disposal information for the following 12 countries: Austria, Belgium, Finland, France, Germany, Italy, Netherlands, Norway, Spain, Sweden, the United Kingdom, and the USA. Some countries report more than one relevant survey, so that we have a total of 21 surveys. Table 1 presents an overview.

[Table 1]

In addition to these 21 surveys, we also have information from European countries taken from the so-called Eurobarometer surveys of 1979 and 1989 (Commission of the European Communities, 1979; INRA, 1990). The 1979 survey was held during the month of April in the then nine member countries of the EC. Sample sizes varied between 974 (Netherlands) and 1317 (UK), with the exception of Luxembourg, where the sample comprised 299 persons. The target population was persons aged 15 or older. One question was asked about the ideal number of children (in addition to questions on, among other things, demographic background variables). The 1989 survey also included a question on the ideal number of children. The survey was held in the then twelve countries of the community, with interviews taking place during the period October-November. One thousand individuals were interviewed in each country, with the exception of Luxembourg and Northern Ireland, where 300 interviews were carried out. The respondents are representative of the population aged 15 years and over.

Although these two surveys cover many countries of our target group, the data are of limited use only. Sample sizes (approximately 1,000 persons aged 15 and over) are so low that there are too few respondents (approximately 200) of the type we are interested in, i.e. women aged 15-39, say. In Section 2.3 we will present for a number of countries a comparison between the ideal number of children according to the Eurobarometer surveys of 1979 and 1989 and the expected number of children obtained through our survey.

There is evidence that expectations, intentions, and preferences differ between partners, see for instance the so-called Limiting Factors method applied in the Netherlands (Section 4.1). This is related to the fact that in contemporary society, fertility and family formation are parallel processes of affection and negotiation between partners. Moreover, this process is sometimes repeated for subsequent partnerships of either one of them, at least up to a certain age. Thus responding couples who are currently experiencing such processes may report different intentions. But fertility surveys in which both partners are interviewed about their childbearing intentions, independently of each other, are too few.[3] Therefore, the analysis is restricted to women.

The available data do not always come from a recent survey. This is particularly the case for Spain where the most recent data refer to 1985. The Norwegian figures are for 1988 and the UK figures for 1989. Although this makes it easier to see to what extent expectations have been realised, the drawback is that the expectations for the future - adjusted via this project - are less useful. The Netherlands, France and the UK have supplied data from three surveys; Spain, Norway and Austria from two surveys. If more than one survey is available per country the expectations can be evaluated better and if necessary be corrected for overestimation in particular. The PAF method, for example (see later on), is based on the fact that data from at least two surveys are available. For Italy no suitable data were available to apply in the correction method. So Section 6 of this report refers to ten European countries only.

2.2. Sample, representativeness, case- and item non-response, and «don't know»

Table 2 shows how the samples have been defined, and to what extent responses are representative of the target population. Restricting the sample to non-single women (Italy in 1979 and Spain in 1977) was appropriate as extramarital fertility was sufficiently low. In more recent surveys in Italy and Spain women of all

[3] It would not be sufficient to obtain information from the woman about her partner's expectation, preference and/or intention, as she might give a biased response.

marital status are sampled, as in the other countries. Belgium and Germany restrict the sample to native women only. While this may be good choice from a practical point of view, it would imply a downward bias in fertility indicators, as fertility among foreign women tends to be higher than that of natives. In surveys in France (1977, 1987), Italy (1988), Norway (1988) and probably also the UK, childless women are underrepresented. Whether childless women are not underrepresented in other surveys is difficult to say: perhaps the number of children was not among the variables checked; for a number of surveys there is no information at all regarding representativeness. The surveys for the Netherlands (1993) and Germany have been weighted according to number of children and household size respectively. For those two surveys there is probably no bias with respect to number of children. For other countries we have to take the possibility into account that historical and future numbers of children reported by the respondents are too high.

[Table 2]

The last part of question 7 - how item non-response on expectations questions was dealt with - was not always answered in the same way. It is also difficult to ascertain from the answers given how the less accurate answers are taken into account in the calculation of the average ultimate expected number of children (in many countries respondents were asked to give a range). Part of the problem is the fact that a «don't know» answer to the expectations question is not always distinguished clearly from a situation in which the respondent does not want to give an answer. As discussed in Section 1.2, a «don't know» answer should be treated as a valid and meaningful response, and not as item non-response. Where countries did describe how they cope with this problem, the question still remains whether other assumptions would have led to other results. In the last chapter of the present report we conclude that countries should pay more attention to the uncertainty of answers - if they do not, it is difficult to use the results for forecasts. According to findings of the Dutch fertility survey uncertain women especially affect, or in actual fact determine, the results for young cohorts (see later).

Some countries ask no further questions after a "don't know" (Sweden, Germany, USA) others go on to ask for a maximum or minimum number (Netherlands, Belgium) or an estimate (Austria) or give the possibility to answer 0/1, 1/2 etc. (Finland). Other countries (Spain) did not answer this question adequately.

In the calculation of the expected total fertility many countries just leave non-response out (Austria 1992, Finland, Germany, Norway, Sweden, USA, United Kingdom); others assign a figure for women with the same age or number of children. Others again make variants with minimum and maximum estimations (Netherlands, Belgium). The share of "don't knows" in Austria (1992) and Spain (1985) was only 0.2 and 0.3 per cent respectively. In Austria (1991) the uncertain

women had the possibility to give a wide range in the number of expected future children (0-5, for example).

2.3. Questions on future fertility

The formulation of questions on future fertility differed between the countries, see Table 3. The English translations (except for the UK and the USA) were given to us by our colleagues (see Table 1). Some countries ask about "desired" or "wanted" number of children. Some countries also ask for the number of children considered to be "ideal" by the respondent, which measures a norm, rather than a personal intention. As the word "expect" implicitly asks respondents to assess the possibility of their achieving their desired number of children, this formulation is to be preferred for forecasting purposes. Only three countries (Netherlands, Norway and USA) literally ask for the "expected" number of children and one country (United Kingdom) asks "do you think you will have" but considers the answers as "expectations", which is more defensible than when the "desired" number of children is asked. In Westoff's (1981) opinion, the formulation of the question is not very relevant. He claimed that the subtle differences between "ideal", "desired" and "expected" number of children are not conceived by the respondents. However, one may argue that there may be differences by social class and/or other characteristics in this respect.

[Table 3]

Westoff's opinion is supported by data we have for the Netherlands and Norway. Moors (1974, 34) reports about a fertility survey in the Netherlands carried out in 1969 and shows a strong correspondence between averages of desired and expected numbers of children in first marriage cohorts 1958, 1963 and 1968. At the individual level the correlation between desired and expected number of children is strong for the youngest cohort 1968 (0.82) but much weaker for the eldest cohort 1958 (0.35). The latter group of women may have had unexpected birth experiences. The Dutch version of the World Fertility Survey carried out in 1975 showed that expected and desired numbers of children were identical in 93 per cent of the cases; 56 per cent of the women did not want to have any additional children and did not expect any; 37 per cent did want to have an additional child and also expected to have one (Netherlands Survey on Fertility and Parenthood Motivation, not dated, 33). Noack and Østby (1981, 319-320) have analysed the agreement between ideal and expected number of children in the Norwegian Fertility Survey of 1977. Between 70 and 79 per cent of the women aged 18-34 who expected 2 or 3 children in all also regarded that number as ideal for a family in Norway. For women aged 35-44 the correspondence was somewhat weaker (59 per cent for two children, 71 per cent for three). We did not

come across an analysis of the agreement between expected, desired, and ideal number of children broken down by social class or other characteristics.

Recognizing the fact that in some situations there may be differences between expected, desired, and ideal number of children, we have nonetheless decided to use the term "expected number of children" as an overall notion in the remainder of this report.

Figure 1 shows the ultimate expected number of children by age in the available surveys. Figure 2 contains the figures for the most recent surveys. The figures illustrate that there are great differences between countries and ages. Furthermore the lines cross each other. We also included in Figure 2 the results of the Eurobarometer surveys of 1979 and 1989. Five of the countries in our own survey participated in the Eurobarometer surveys: France, the United Kingdom, the Netherlands, Belgium and the Federal Republic of Germany (Germany). Note that the Eurobarometer data apply to the ideal number of children, with averages for the whole sample for each country (i.e. men and women aged 15 years and over). In spite of these differences there is a reasonable agreement between the figures collected through our survey and those from the Eurobarometer surveys. The figures for ideal number of children in the latter are relatively high in the Netherlands and Germany. One possible explanation is the rather steep fall in fertility in these countries in combination with the high mean age of the sample. The proportion of persons in the Eurobarometer sample aged 55 years or over was around 30 per cent both in 1979 and 1989 (Commission of the European Communities, 1979, 8; INRA, 1990, 10). These elderly people reported higher ideal numbers of children than on average. It is not unreasonable to assume that the steeper the fall in fertility in a country has been, the larger will be the gap for the ideal number of children between the elderly and the whole sample, because ex-post rationalization will lead to a close correspondence between ideal and actual number of children for couples beyond fertile ages.

[Figures 1 and 2]

2.4. Time horizon for birth expectations

When asking people about what they expect will happen in the future, it is fundamentally important to define the period of time you are referring to. All countries in the survey ask for the total number of children people ever expect to have (long-term expectation). In just over half the surveys respondents are asked when they expect to have their first or next child (short-term expectation): Belgium, Finland, France 1987, Germany, Italy 1979 and 1991, Netherlands, Norway, Spain, see Table 3. From the literature discussed it appears that the

expectations for the near future are much less reliable than those in the long run. It turns out that women expect to have their next (or first) child on average much sooner than they actually do. The time it takes to conceive and the delaying effect of practical circumstances (e.g. having to move house first) are probably underestimated.

Short-term expectations

The 1985 Dutch Fertility Survey was a follow-up of the 1982 survey panel. So in this case we were able to check realisations with the aid of individual data. It appeared that only 60 per cent of women who had expected to have a baby within three years actually did have one. Fewer childless women in particular had a baby, and among these especially those who were not married. Even if we have no available individual data we can examine the realisation of the expectations by comparing them with numbers of children born in the overall population. This can only actually be done for Finland, Norway and France. All the other countries ask a question on the short-term which cannot be checked with population data (Netherlands FS'93), or they give no data about this (Italy, Belgium) or they do not ask the question at all.

In Finland, Norway and France short-term expectations are higher than what is observed in reality (Table 4). French women born in 1967 only get one-fourth of the children they expected during the years 1988-1992. For Finnish women born in 1964-1965 the share was less than 40 per cent (period 1990-1992). On the short term (1989-1992), young Norwegian women only got one-third to one-half of the children they thought to have; on the long term (1978-1993) the share was still between two-thirds and three-quarters.

It is clear that young women overestimate their future births also in periods with relatively stable fertility trends, or even when fertility rates rise. The Finnish Fertility Rate increased weakly during the years 1990-1992 (from 1.78 to 1.85). French women experienced a slight decrease in their TFR in the period 1988-1992 (from 1.80 to 1.73). Finally, the Norwegian TFR rose from 1.84 in 1988 to 1.93 in 1990, and next dropped slightly to a level of 1.89 in 1992. Thus the fact that young women tend to overestimate their future births also in times of stable or slightly rising fertility indicates that the strong overestimates found during the 1960s and 1970s cannot be explained by the rapid fall of fertility during those years alone. Young women are inherently too optimistic: for most of them, it would be difficult to take the possibility of infecundity or a break-up of the current partnership later in life explicitly into consideration.

[Table 4]

2.5. Approach for fertility forecasting

Eurostat's 1994 review of most recent national population forecasts in the countries of the EU and the EFTA (Eurostat 1994) reveals that of the 18 countries for which information is available, only seven use birth expectations in their fertility forecasts: Austria, Finland, Ireland, Netherlands, Norway, Portugal, and the UK. This number is probably too high: for instance, according to our survey, Ireland and Portugal do not have a survey with birth expectations (see Section 2.1), and Norway did not use the data collected in 1988 for the subsequent forecasts. Most countries (12 out of 18) extrapolate completed cohort fertility. Graphical extrapolation is quite often used (seven countries), but also simply constant rates. One country may use different methods for different variants, or combine various methods for one variant. Other characteristics than age, for example birth order, marital status or nationality, are hardly used. For nine countries assumed levels of completed cohort fertility for cohorts in childbearing ages (cohorts 1950-1975) are available. All nine assume a downward trend towards cohort 1975.

2.6. Use of birth expectations data in fertility forecasting

Most countries do not use expectations for national forecasts. Some countries, such as France, do not think it makes sense, but do not explain why not. Norway gives the reason that expectations expressed in 1977 for births in the next five years turned out to be very unreliable; at the time of the analysis of the last survey (1988) Norwegian forecasters did not have a reliable method to correct for this and the feeling was that these answers expressed a norm rather than future behaviour (this is a variant of Westoff's finding/opinion, 1981). Short-term expectations have always been much more unreliable than long-term ones. Moreover, expectations dating from 1977 suffer from the fact that the process that sometimes is called the second demographic transition (in which birth rates fell rapidly, see Van de Kaa, 1987) had not yet been completed. One reason for Belgium not to use the expectations is that the Belgian fertility survey asks for the desired, but not the expected number of children. This subject is still under study.

The only countries that actually used expectations in a forecast model are USA, the Netherlands, United Kingdom (and Australia). How they did this will be discussed later. It is possible that other countries have done something similar, but we have not been informed of that fact. We have reasonable knowledge of what the countries included in this survey have done.

3. RELEVANT FACTORS AND THEORIES

3.1. Overestimation of expected future number of children of individual women

When we use the term "expectations" in the remainder of this report, long-term expectations are meant.

The literature shows that women usually overestimate their future number of children but that this overestimation was stronger in the early seventies than later, see also Section 1.2. There are two reasons for this. First of all there are the so-called "limiting factors": unexpected events such as divorce and infecundity which interfere with planned family formation. We shall discuss these in Section 4.1. The second cause of higher expectations is a "real" change in opinion or attitude towards children in the course of time. It is probable that a proportion of women in a country still in the process of the second demographic transition (during which opinions about children change drastically) will alter their preference (process of diffusion). The figure observed during interviews is only an indication at a random moment in time and will change as long as the diffusion of modern behaviour still is in progress. While the transition has probably already been completed in Northern European countries, in Southern Europe it is probably still in progress, see also Section 3.3.

The still ongoing transition is probably the reason for expectations at the end of the seventies in the USA not coming out at all (transition was still under way) while they were much more accurate a few years later (transition completed). The total number of children expected by married women dropped from 3.1 to 2.2 between 1967 and 1979 (Bachu, 1992). Since then the figure has remained nearly constant. Unmarried women were only included in the survey from 1976. The total expected number of children of all women regardless of marital status aged 18-34 years has remained on the same level up to today, swinging between 2.0 and 2.2. In Spain, Norway and in the Netherlands - countries with birth expectation data that cover a long period - the transition is also visible.

It appears from the literature that women often overestimate their expected number of children, but in certain circumstances the opposite i.e. underestimation, may occur. West Germany, for example, has been in a very deep TFR trough for a number of years now. Furthermore, a remarkably high proportion of German women (31 per cent) answered the expectation question in the German Family and Fertility Survey with "don't know" (Pohl, 1994, 3). This indicates great uncertainty with respect to family size and it is then to be expected that women who do express an expectation will be cautious and give a low number of children, influenced somewhat by the current patterns of period fertility (which could be seen as a sort of norm). For this country then the figure is an

underestimation, rather than an overestimation. In East Germany fertility is even lower, but that has much to do with the unfavourable economic situation and the uncertain future.

3.2. Effect of non-response

A number of factors connected with the fact that the data are survey based may imply that the estimated average number of children deviates from the actual number in the population. The reliability of the measurement is not that important: deviations among individuals will cancel each other out to a large extent. Potentially more important are case non- response (refusal to participate in the survey) and item non-response (no answer to the question on future number of children).

First of all, not participating in the interview may cause the responding group to be selective. Women who do not want children may be underrepresented, as may be single people and working women who are difficult to contact because they often are not at home. This would mean that the number of children among non-respondents is lower than in the response group. To which extent this is indeed an important factor is difficult to ascertain. Even in the Netherlands where a lot of research has been done into expectations there is no certainty about this. A number of countries (Austria, France, Germany, Netherlands, and USA; see Table 2) use reweighting to try to make their group of respondents as representative as possible as far as marital status and/or household position and number of children are concerned, but this gives no certainty for expected number of children. We shall return to this in the last chapter.

The Dutch 1988 Fertility Survey gave respondents the option of completing a short written questionnaire if they did not want to complete the long oral one. It turned out that women who did this were much more uncertain about their future number of children than the women who completed the long questionnaire. These are probably women for whom the subject is not yet or no longer important.[4] Due to this the minimum estimation for women who opted for the short questionnaire was much lower than that for the other respondents. It is probable that the number of children of all responding women together give a better estimation for the population than only the figure from the long questionnaire. This would mean a reduction in the ultimate number of children by 0.1 child. Let us assume that women who completed the short questionnaire would not have responded if the "short option" had not existed and that the women who refused to answer (the expectation question or not at all) on average expect to have the same number of

[4] There may also be an effect caused by fact that the short questionnire was a written one, whereas the long questionnaire was asked orally, see below.

children as those who completed the short questionnaire. Then we get an expected number of children for the Netherlands which is much lower (about 0.25 child). But it may also be the case that the expectation question is answered much less frequently on paper than in an interview. It would therefore not be realistic to regard written answers as representative for total non- response. All this gives too little quantitative insight to be used for other countries in the current project.

Not answering the question on expectations (item non-response) may also influence the calculation of the future number of children. Some countries just leave these women out of account; others ask for a maximum and a minimum number of children.

One in ten Dutch women under 25 interviewed in the 1988 Fertility Survey was uncertain about whether or not she would have children; in the 1993 survey this proportion was much lower. This leads to great differences in the minimum expected number of children between the two surveys for all responding women. If the expected numbers of children are calculated for the certain women only, then the differences between the figures for 1988 and 1993 are reduced.

The difference between the minimum and maximum desired number of children in Belgium is reasonably small: 2.0 compared with 2.14. This is much smaller than the difference in the Netherlands. The published numbers of children refer to the average desired number of children (Cliquet and Callens, 1993).

In the 1992 survey in the USA 13 per cent of respondents did not answer the question on expected number of children and another 15 per cent said only that they were uncertain (they were not asked further about future children, see O'Connell, 1991; Bachu, 1992). Nothing was done with the item non-response, but via the answers on uncertainty (which is actually also a sort of non- response) a sort of "uncertainty interval" was calculated for ultimate childlessness (the group of non-respondents was left out of account completely). The maximum figure for the youngest generations was nearly 25 per cent, the minimum figure under 7.5 per cent. For baby-boom women, childlessness was studied on the basis of the long time series of survey information. Women from the age of about 25 years who are uncertain usually remain childless. They might want children but they realise that there are circumstances under which this just may not happen. For the younger women who have their doubts the assumption "will have children" is a better one. Here their doubts are connected mainly with their youth: they just cannot oversee the future. As most women have children, most of the young respondents will too.

In any case it is presumable that the (un)certainty of the answers is related to the stability of the general opinion of the population about the desired or ideal family size (O'Connell, 1991; see also Morgan, 1981, 1982). An increase in uncertainty is

an indication that there has been a change; a reduction in uncertainty on the other hand that the situation has become more stable. The latter should then be the case in the Netherlands in 1993. Something similar happened in the USA between 1965 and 1970: women who said they did not want another baby began to have doubts about their plans. They were in the middle of a period of declining fertility rates.

3.3. The development of the TFR's in the EU and EFTA

The general pattern of the TFR in the EU and EFTA is that of a slight increase in the period 1950-1965. In some countries (France) this was caused by women having large families, but in the Netherlands it was caused only by a declining age at (marriage and) birth. Around 1965 the TFR in Central, West- and North-European countries started to drop. The decrease was especially strong in the Netherlands (the TFR halved in 10 years), Finland, Denmark and Austria. In the mid 1980s (earlier in Finland) a moderate recovery took place which was greatest in Denmark and Sweden: more than 0.5 child. The general pattern seems to be: the greater the drop, the greater the recovery or the catching up. For Sweden there is a clear reason for this. In the course of the 1970s and 1980s a number of government measures were introduced making it easier and less costly to combine work and children (Hoem, 1990). Paid maternity leave was significantly extended to 30 months in 1986. This affected the spacing of children: more children than previously were born after intervals of less than 30 months. This meant that the TFR rose strongly but the effect was only temporary: in 1993 there was a relapse. In Denmark on the other hand there has been a rise in the last few years of around 0.5 child. In the West-European countries a rise in the TFR is already noticeable. It looks as if this will continue in all countries, so that the completed cohort fertility (CCF) the cohorts will achieve has not yet been reached. In southern Europe there was a slight drop in the mid-1960s but only ten years later a sharp drop took place. In recent years the decline has been weakening. In analogy with the northern countries it is to be expected that the TFR will start to rise in the next few years and as the fall will be greater the rise may be more than by 0.5 child (assuming the trend is caused mainly by the rise of mother's age at birth). It is of course also important how high the marriage rates stay and to what extent child care facilities are introduced. Figure 3 plots the course of the TFR from 1980 for countries where expectations can be studied and corrected.

[Figure 3]

3.4 Relation between total fertility rate (TFR), completed cohort fertility (CCF) and expectation (E)

It has long been known that the total fertility rate (TFR) fluctuates much more strongly than completed cohort fertility (CCF) does. Due to declining CCF and rising ages of mothers at birth, the TFR has dropped under the level that the CCF probably will achieve.

Theoretically speaking the following development takes place.

- Due to overestimation of the first kind the expected ultimate number of children (E) will systematically be above the level of the CCF; if the timing changes strongly, the CCF will be closer to E than to the TFR. If the CCF in particular drops then it will be closer to the TFR.
- E decreases gradually during the transition (diffusion process), but much less strongly than the TFR.
- Only at the end of the transition will the TFR "climb" to the level of the CCF.
- At the moment the CCF is between E and the TFR (except probably in Sweden).
- The transition is still in progress in most countries and the TFR is therefore still lower than the CCF. The rise has not or hardly begun in Southern Europe so the TFR will be well below E (probably more than 0.5 child per woman) especially there.

3.5. The age-period-cohort problem

A well-known problem in the social sciences is the age-period-cohort (APC) problem. When data, for example births, are ordered by the three factors age, period and cohort, it will be difficult to disentangle the effect that each of these three effects separately has on births. The reason is that two of the three factors completely define the third one, since we have the identity A=P-C. Thus the effects of age, period and cohort cannot be distinguished, unless additional assumptions are made. An analysis of the substance of the specific problem should indicate what the best assumption is. On the grounds of the preceding, for example, it may be assumed that all countries display an age effect - a lower expectation as the age rises.

Firstly this may be caused by overestimation because of limiting factors. Secondly the figures for young people in particular may be distorted because of a high rate of item non-response, which is not corrected for routinely. Some countries just leave women who answer "don't know" out of the analysis, others ask for a range and calculate variants based on this. It is necessary to examine how each country

deals with this problem and on the grounds of this to decide whether there is an extra age effect in the supplied figures. Thirdly we may assume that a country such as Spain has a clear period effect because the second demographic transition started later there than in other countries. The 1977 survey and to a lesser extent the more recent survey of 1985 were held when other norms were prevalent than nowadays. For countries such as the Netherlands, the United Kingdom and Belgium which have made more progress than Spain in this second demographic transition it may be assumed that there is hardly any period effect any more. The Scandinavian countries are already in a period where annual fertility is again clearly higher than a number of years ago and the expectations are perhaps a little high due to new government measures etc. Lastly, for all countries, with the exception perhaps of the Scandinavian ones, a decreasing cohort fertility may be assumed.

For many countries expectations for only one moment in time are available, reducing the problem to an AC problem: to what extent is there an age or cohort effect (one equation with two unknowns)? This is the case for Finland for example. There the ultimate expected number of children drops with age, or in other words the number of children is lower the older the cohort is. The latter contradicts what might be expected. It looks as if the overestimation is stronger than the effect of decreasing cohort fertility, but further information is needed to separate the effects. It appears from research in the Netherlands and Australia that the future number of children is overestimated by 10-15 per cent at all ages.

In all available studies the United Kingdom shows the same (decreasing) age-cohort pattern as Finland (Figure 1). So there seems hardly to be a period effect for the United Kingdom. Spain shows in both available studies an opposite age effect: expectations increase with age. This indicates that the cohort effect dominates the age effect, which is not so strange because the transition began much later there. Because the 1977 survey only included married women an exaggerated period effect is visible there. Austria, too, has an increasing expected number of children with age, but this increase is only small. This is indicative of the transition coming to an end.

In Norway the age effect differs between the two surveys. This is mainly because in 1988 the ultimate expected number of children of people in their thirties is much lower. It seems that the transition had not yet been completed in 1977 (pattern somewhat comparable with Spain) and was completed in 1988 (pattern comparable with Finland and United Kingdom). In the Netherlands, on the other hand, the expectations of the youngest women differ strongly. As those of women in their thirties are stable it looks as if the transition had already been completed by 1982. However, there is no clear period effect for younger women. There is no monotonous decline or increase but the figures for 1982 are in the middle. The cause is the fluctuating number of "don't knowers". Also for France the age

pattern differs between surveys. For the eldest women the difference between 1978, 1988 and 1994 is rather plausible: expectations have fallen. A little bit puzzling are the differences for the youngest age groups. Especially the figures in the 1988 survey are very high.

We will 'solve' the APC problem by correcting for age and period effects which are determined on the basis of the literature and theories (correction for age through limiting factors and a conjuncture correction to adjust for the period effect). We assume that after correction the real cohort effect becomes visible in the figures.

3.6. A new transition in Scandinavia?

In view of the relatively high present TFR's and the high expected numbers of children in the surveys there might be a new transition on the way in Scandinavia - and especially in Sweden - in which the average family will be larger than before. A society has come into being in which both parents (have to) work and good child care is available. This leaves room for another attitude towards the ideal family. The three-child family is already relatively popular among the higher educated. If we regard this group as the precursors, i.e. the trendsetters, this could lead to a continuing high TFR and resulting cohort fertility.

This hypothesis does not have a strong basis yet though. In 1993 the Swedish TFR had dropped slightly and studies point in the direction of a still decreasing cohort fertility: 2.01 for the 1930-cohort, 2.00 for the 1940-cohort, 1.96 for the 1950-cohort, and 1.90 for the cohorts born in 1960 or later (the latter value is an extrapolation), see SCB (1994, 18-24) and SCB (1992). The same applies for Norway.

4. AN EVALUATION OF EXISTING METHODS

4.1. The methods used in the Netherlands, the United Kingdom and the United States

Only a few countries in the survey have used the expectations of future children in models for national forecasts: the USA, United Kingdom, the Netherlands. Perhaps not coincidentally these are all countries which use the formulation "expectation". In the USA this material has long been an object of study and expectations of older cohorts are checked thoroughly for reliability, but no model has actually been developed to estimate the ultimate number of children of younger generations (around 20 years of age) via expressed expectations. The United Kingdom and the Netherlands have described two methods to transform expectations into forecast values. The two methods used by the Netherlands were the LF (limiting factors) method and the PAF (partial adjustment forecasting) method.

In the LF method (Van de Giessen, 1992) the situation of the women (in education, living together, different attitude than partner with regard to children) is used to correct (= usually reduce) the expectations. Furthermore, for young women a correction is made for circumstances which may thwart their plans at a later stage, such as divorce and infecundity. In the 1982 Fertility Survey women who already had children were asked whether they wanted the same number of children already before their first pregnancy. About 65 per cent did indeed want the same number, 30 per cent had wanted more, and over 5 per cent fewer. The main reasons for having fewer were health, lifestyle (financial reasons), the heavy burden children entail, and a difference of opinion on this with the partner. On the basis of these results, other analyses and the literature limiting factors have been quantified.

The PAF method (De Beer, 1991) calculates how the expectations of each age group change in the years between two surveys and how many children have been born. This results in adjustments for the ultimate number of children by cohort. In short this method starts out from the assumption that the percentage of expectations yet to be realized depends on age and cohort. Six variants have been developed, starting from different assumptions. These appear to give about the same results. The basic variant and a variant with the assumption that at each age the expectation is reduced by 10 per cent ("variant F", see De Beer and Van de Giessen, 1989) are most relevant for this project.

Werner (1986) describes a method for the United Kingdom which corrects for the high non-response in the General Household Survey 1979-1983 to the question on future number of children and the fact that childlessness among young women appears to be heavily underestimated. The non-responding women are divided

into mothers and non-mothers. It is assumed that the former will ultimately have as many children as responding mothers. The non-responding childless women were regarded as remaining childless (method a) or to have 0 or 1 child in the ratio of responding childless women who gave 0 or 1 as their expectation. In 1991 a different method was used in the United Kingdom, because Werner's assumptions were considered rather arbitrary (Cooper and Shaw, 1993). The new method simply compared the expectations of the youngest cohorts of two surveys, and from this the conclusion was drawn that the final values should have been reduced slightly.

In the USA a lot of research has been carried out into the reliability of expectations, see the volume edited by Hendershot and Placek (1981), and for more recent work at the Census Bureau O'Connell (1991) and Bachu (1992). Expectations are taken into account when forecast assumptions are formulated, but few quantitative models have been designed for this purpose. The best known model is that of Lee (1980). The PAF model used in the Netherlands is an elaboration of Lee's model. It eliminates the restriction of a fixed final level. The findings of Bachu and O'Connell are not so easily applicable to other situations because these authors only carried out analyses for childlessness. From the analysis of expressed expectations between 1976 and 1990 and the realisations in this period, they draw the conclusion that the childlessness of young cohorts (under about 22 years) can better be approached by assuming that the uncertain women have children than by assuming that they will not have children. However, no further specification is given.

Finally, according to Van de Giessen (1992) Australia applied a very simple method. Reported additional birth expectations were reduced by 20 per cent for women who had borne no children at the time of the survey, and by 10 per cent for women with one or more children.

4.2. Evaluation criteria

There are a few important criteria which can be used to test the discussed methods in order to examine their usefulness for further application. These are:
- validity (do the results reflect reality sufficiently?);
- reliability or stability (does a similar survey give the same results?);
- complexity (does more complexity offers a better performance?);
- need for data (as few as possible);
- applicability (can be applied to many countries).

The limiting factors method applies reduction factors to individual expectations which correct for unforeseen circumstances which have a negative effect on

fertility. These factors can really only be estimated with long panel surveys. We can get useful information from other research, but all in all many assumptions have to be made. Getting back to the criteria: the method is reasonably valid but not optimal. It does not correct for possible selection of the target group (although this may be included in the factors if these are based on realisations at population level). The method is reliable because the results correspond well for various NFS surveys. The complexity and the need for many data are, however, negative points. In principle this method can be used fairly broadly viz. for all countries which conduct large surveys.

Broadly speaking, the PAF method arranges reduction factors by age and then the ultimate averages for the youngest cohorts result. In the basic variant for each age group the observed change in realisation and (remaining) expectation is sustained for the other cohorts. One variant uses an assumption which is valid for the Netherlands, namely that the realisation for all ages is 10 per cent lower than reported expectations. This means that the ultimate number of children for the youngest women is also 10 per cent lower than the expressed expectation.

The method corrects for all discussed distortions at the same time. This is because the PAF method uses - or can use - realised numbers of children at population level and bases the adaptation of the ultimately expected number of children on this for each age group. This makes the method very valid. Moreover, it can be used both in the case of a panel survey (individual level) and in two cross sectional surveys (group level).

According to De Beer and Van de Giessen (1989) this method is reliable too. It is not very complex but does require a reasonable amount of data; at least if no general assumption is made (e.g. for each country the Dutch situation is valid, viz. for each age 10 per cent reduction of the remaining expectation). The method is applicable in all countries. But the percentage to be used will differ from country to country, depending mostly on specific item non-response. In Australia, for example, a higher percentage was applied: a correction of 20 per cent for childless women and 10 per cent for mothers.

The method applied by Werner for UK expectations corrects for non- response and not or only implicitly for individual overestimation. Furthermore there are quite a lot of assumptions which are a bit questionable. This method is therefore not an optimally valid one. It is difficult to determine the reliability, but it seems to be all right. The advantage of the method is that it is not complex, requires few data and is widely applicable. Roughly the same is true of the Bachu/O'Connell method.

The method of Shaw and Cooper which examines more indirectly the direction of the expectations is valid and reliable but requires rather many data. In principle it

is applicable everywhere where there is more than one survey, but that is by far not the case in many countries.

Taking the above into consideration, there does not appear to be an ideal method. The Dutch methods and the second UK method require too many data and the first UK method and the American method are not valid enough.

For the sake of completeness it should be mentioned that expectations can be used in forecasts directly without corrections (naive method) or in combination with other data, mainly qualitatively weighted (consultancy method). As users can always do this we shall not go into these methods here. However, due to the collected evidence of distortions of expectations, the naive method is certainly not an optimal choice.

5. APPLICATION OF A COMMON APPROACH TO COUNTRIES REPRESENTED IN THE WORKING PARTY ON DEMOGRAPHIC PROJECTIONS

5.1. Choice of a common approach

In view of what has been said in the previous chapter, the logical next step would be to develop a new method which takes into account item non-response, period effects and limiting factors. Not all these factors will have to be corrected in all countries. In the Netherlands, Belgium, Austria and the United Kingdom, for example, item non-response is taken into account by calculating variants. Belgium, Sweden and Austria choose a middle variant (but do not give a reason for this). In the Netherlands the "low variant" is always used to correct for item non- response. However, the low variant figures for 1993 do not differ very much from those for the medium variant.

It is just in the countries with expectations high above replacement level that the uncertain/non-responding women are excluded from the calculations! For Sweden it is unclear how these women are dealt with, but non-response is not so high there. For Spain - the other extreme as far as expectations are concerned - the same applies though. This difference is supposed to be attributed to transition uncertainty. More detailed data are necessary to deal with the non-response effect adequately.

There is rather strong evidence from the literature that expectations are subject to period-effects (Westoff and Ryder, 1977). Some experts, for instance in Norway, even think that expectations mainly reflect current fertility level and can hardly be considered as an indication for future family size. Indeed the data show a strong association between the TFR in the survey year and the expected family size (Figure 4). This association is somewhat stronger for the young cohorts until the age of 30 than for women who are in their thirties or over and often have already started family formation. However, the association between the TFR and the expectations seems to be partly a spurious one: both the expectations and the TFR are influenced by current norms regarding fertility. The direct effect of the TFR on the expectations therefore is much weaker than the figure suggests.

[Figure 4]

So the expectations can be influenced by the present fertility level (a sort of sociodemographic "business cycle" effect). In principle, for six countries for which more than one survey is available (Spain, France, Netherlands, Norway, United Kingdom and Austria) this 'conjuncture-effect' could be deduced from the observations. However, as discussed above, the APC problem plays a part here, so that the question is whether it is possible to obtain valid estimates. Moreover, very

few data are available and those which are available refer to years which sometimes are rather close together (for instance Austria 1991 and 1992). Furthermore, for the United Kingdom and Austria there is hardly any period effect visible and in the Netherlands and France there is an unclear effect (Figure 1). Only for Spain and Norway does there seem to be a period effect which is due to the second demographic transition.

So it seems necessary to correct for the period effect in another way. This method must be applicable in all countries including those for which data on only one year are available. This can be done in the following way. On the basis of the course of the TFR we establish for each country how much progress they have made with the transition process and whether they are experiencing a low, middle or high "business cycle". Depending on this, correction factors can be chosen.

It is probable that the same limiting factors play a role in all the countries but with the available data it is not possible to ascertain whether their effect on the expected future number of children is equally large everywhere. The Netherlands used a discount of 10 per cent (after a correction for uncertainty), Australia 10-20 per cent. For forecasts the expectations of young women are the most important. But plausibility checks (to be discussed later) are easier if expectations of all ages are corrected (under the assumption of a monotonously decreasing number of children).

Summing up, the proposed method consists of three parts:

a. correction for item non-response;
b. correction for period effect - an increase or a decrease;
c. correction for limiting factors - 15 per cent reduction (method a) or 10 per cent reduction (method b).

5.2. Application

Corrections for the long term expectations were applied to ten countries. For Italy no appropriate data were available. The letters a, b and c refer to the above corrections; where a or b is placed in parentheses this means that the correction is not yet final or cannot be applied. The following scheme results:

- Sweden, Norway, Finland, Spain: (a), b=reduction, c;
- United Kingdom, France, Netherlands, Austria: (b), c;
- Germany, Belgium: (a), b=increase, c.

For Northern Europe a high "business cycle" is assumed. In the context of the correction for the period or conjuncture effect, a reduction of 0.15-0.2 child was

chosen. The Netherlands, Austria and the United Kingdom all seem to be in a medium business cycle. The expectations are stable in the course of time and there has been a reasonably constant TFR in the last 10 years. A period correction does not seem to be necessary. The same seems true for France. Germany is clearly in a cycle dip. An increase of 0.2 child was applied. To Belgium an increase of 0.1 was given because of the fact that the TFR is minimal at this moment and the plausibility checks showed that the adjusted expectations were rather low. In 1985 Spain was still in the downward transition. Therefore a correction by -0.2 seems realistic. As not much is known about the period effect from the literature, unlike for the limiting factors, the assumptions are even more arbitrary. Smaller adjustments are hardly meaningful, larger ones would make the differences between countries unrealistically small.

Next the countries were corrected for the limiting factors. Two corrections were applied; one with a reduction by 10 per cent and one with a reduction of 15 per cent. Both choices can be defended on the grounds found in the literature.

Depending on age the method must be applied differently. For young mostly childless women the description given above is completely correct. For older cohorts which already contain many mothers the corrections need only be applied (obviously) to future numbers of children. The "business cycle" correction is an exception to this rule. Up to 30 years for the Scandinavian countries and Spain (in all cases a reduction) it is better to apply this to the "total" number of children. Beyond age 35 expectations are low, and corrections have little impact.

Because so many different factors play a part the emerging picture is still very unclear when the most recent expectations by age for each country are compared (Figure 2). For instance some lines cross each other which means different trends.

Firstly the correction was applied to young women. The results can be seen in Figure 5. Both the methods a and b lead to results which are considerably lower than the original expectations (due to the age correction) and the mutual differences are about halved (due to the conjuncture correction).

[Figure 5]

5.3. Plausibility checks

We must now decide which of the two correction methods gives the most plausible results. There are a few possibilities to check the plausibility of both series. Firstly, the corrected ultimate number of children must be higher than the minimum observed TFR (we assume that all countries already reached or passed

the stadium of the fertility transition where TFR is minimal). For Sweden the recent TFR's are 0.5- 0.4 child higher than the minimum figure in the past. For Norway and Finland the figure is 0.2-0.3. We assume that for the other countries, which are in transition yet, 0.3 is appropriate. (There may be differences though; this depends on the actual changes in mother's age at birth). Furthermore, when fertility transition comes to an end, period TFR rises to the level of the cohort fertility (Section 3.3). So for Scandinavia the adjusted expectations must also be about as high as the recent TFR's.

Another possible check is based on the fact that young cohorts will have fewer children than the older cohorts who have already (almost) completed their family. Lastly it is useful to compare the results with the hypotheses of the national forecasts (medium variants), as in these forecasts probably very much information is used which we do not have.

Expectations for the young cohorts corrected according to method a are reasonably close to the minimum TFR's - the distance is less than 0.35 child. The figures of correction b (-10 per cent) are about 0.1 higher and in view of the theoretical value of 0.3 less plausible (Figure 6). Both series are for all countries (including Sweden, Norway and Finland) higher than the 1993 TFR (series a for Sweden is somewhat lower than the TFR's in the beginning of the 1990s, but then there probably was a temporary period-effect due to new regulations). Both series a and series b are lower than the expectations of the oldest group (which will be only a little lower than the ultimate number of children). One country -Finland- is very close to b. Therefore series a is somewhat more plausible.

[Figure 6]

Lastly series a corresponds best with the values used in the national forecasts. The forecasts for Spain and Finland deviate most strongly downwards. The 1993 TFR for Finland is higher though than the national forecast, which makes the national forecast seem a bit implausible. Also the forecast for Spain seems rather low. We can conclude that especially after correction a plausible total numbers of children for young women emerge.

Results for all age groups

Figure 7 shows the results for all age groups when method a is applied. For most countries the adjusted expectations show a plausible pattern, i.e. a positive correlation with age. Sweden and France are exceptions: women in their thirties have the highest figures. Maybe there is a 'real' cohort-effect, but overrepresentation in this age group of women with children or wanting children may also be the cause. A third possibility is an even higher overestimation than 15

per cent of their future number of children. For Sweden also a larger conjuncture-effect may exist. With the available data this question cannot be solved.

[Figure 7]

6. CONCLUSIONS, DISCUSSION AND RECOMMENDATIONS

Our survey has shown that only a few countries use birth expectations in a more or less direct way when formulating assumptions for their population forecasts. Most forecasters seem to be sceptic about the usefulness of such data for forecasting purposes, because the data probably reflect current norms, rather than future behaviour. In times of strongly rising or falling fertility, the use of such expectations data obtained from young women would then lead to considerable bias, compared to the true fertility behaviour of those women in later years.

Other sources for distortion are total (or case) non-response (childless women have relatively high non-response rates) and partial (or item) non-response (how to treat women who answer "don't know" to the birth expectation question?).

More or less sophisticated techniques that correct for these distortions have been developed by the Netherlands and the UK. But these methods require detailed data, and they cannot be used more generally in other countries with a less favourable data situation. Therefore, we propose a simple method that is more generally applicable. The method builds on three subsequent corrections of data on birth expectations obtained from a survey: one for partial non-response, one for what we called period effects (in some countries, period fertility is decreasing - in others it increases; this leads to overestimations/underestimations of future fertility, as measured by childbearing intentions), and one for the fact that young women in general are optimistic regarding the availability of partners, and the fecundity of the couple (age effect). The proposed method is based on the assumption that total non-response can be ignored (due to high response rates), or has been dealt with (for example, by weighting the sample).

Corrections are carried out on aggregate numbers: average numbers of expected children by age, for example in five year age groups. Next, average numbers of children already born at younger ages are added to these corrected numbers.

The first correction takes account of the women who are unable to give an exact number of expected births. If a minimum and a maximum number have been obtained, we propose that both numbers be used in order to reflect uncertainty. When "don't know" is accepted as an answer, we propose that these women not be omitted from the further analyses, but rather that they be assigned a minimum (zero) and a maximum number (for instance one plus the average number for responding women of the same parity) of additional children. The first correction may be done in the future, but at present the necessary data are not available to us.

In order to carry out the second correction, countries have been divided into three groups: countries with high, with intermediate, and with low period fertility. Expectations for young women from high fertility countries are adjusted

downwards by 0.15 to 0.20 child. Those of young women from low fertility countries are adjusted upwards by 0.20 child. No correction is applied for young women from the remaining countries. Women at higher ages receive proportionally lower corrections. The age effect is adjusted for by simply reducing the numbers obtained in the previous steps by 10 or 15 per cent (third correction).

The proposed second and third correction has been carried out for ten countries: Austria, Belgium, Finland, France, Germany, Netherlands, Norway, Spain, Sweden, and the UK. A comparison with observed total fertility rates, and with fertility levels assumed in the most recent population forecasts leads to a plausible picture, in particular when the correction for the age effect is 15 per cent.

Although the proposed adjustment procedure is simple and seems to result in plausible fertility levels for the countries that we have tested, it is not without problems in the case of correction for the period-effect. Crucial here is the assumption that all countries follow the same fundamental transition in childbearing, namely a transition from a situation with a low to one with a high mean age at childbirth during a period in which completed cohort fertility only drops gradually. This leads to a temporary fall of the TFR. We further assume that the countries are in a different phase and that the current situation influences the actual opinions to some extent. All countries have experienced a decline in fertility but only the Northern European countries have already seen a rise in period fertility to a level of about 2 children per woman on average. The countries in Western Europe until now showed a smaller rise. This development can be explained by a process of postponement and catching up of childbearing; a process which has come much further in some countries than in others. What we assume is that the other countries will complete their transition in more or less the same manner. So for countries that are in the beginning or halfway of the transition - as the Southern European nations - we have to assume more than for countries which have completed it. The possibility that a new transition will start can be excluded on rather safe grounds (the rise of the TFR in Sweden already stopped and we may conclude that it mainly was a matter of shorter birth intervals, rather than higher completed cohort fertility).

Summarizing one can say that the problem of the reliability of fertility expectations has been reduced to two assumptions: firstly that in all countries there is a similar age-effect (especially young women overestimate their future family size) and secondly that there is a similar fertility transition in all European countries which is (almost) completed already in Northern Europe and is still going on in Southern Europe. The first assumption is based on the available literature on expectations. The second assumption is based on the described development of the TFR's in the countries and is confirmed by the changes in the age-specific fertility rates which show everywhere a rise of mother's age at birth (see report prepared for this meeting about the development of fertility in Europe).

We hope this report makes clear that expectations can play a role in understanding the future, but that a complete view on the long-term development of fertility needs additional information concerning fertility: trends from observed statistics, socioeconomic and sociocultural empirical analyses, data from forerunner countries, etc.

Finally, there are two recommendations. The first one is to pay more attention to women who are uncertain about their future births, i.e. the "don't knows". In future surveys (and this practice is already followed by a few countries) these women should be offered the possibility to indicate a range for their expectation (for instance 0-5), or a maximum and a minimum number. The fact that these women are uncertain bears important information, and this should be accounted for in the analysis. Secondly, we recommend that the representativeness of the responding women be checked according to a number of variables, ideally age, region of residence and current number of children. Reweighting should be carried out, if necessary. This would at least partially solve the problem caused by the fact that non-responding women probably expect fewer (additional) children than comparable responding women.

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APPENDIX: QUESTIONNAIRE

QUESTIONNAIRE ON THE LINK BETWEEN BIRTH EXPECTATIONS AND FERTILITY ASSUMPTIONS IN DEMOGRAPHIC PROJECTIONS

The purpose of the questions below is to investigate the link between data collected in surveys on birth expectations, preferred, wanted, or desired family size etc. (henceforth referred to as "birth expectations data" for short) on the one hand, and fertility assumptions in national demographic projections on the other. The focus is on women born after World War II. Possible information obtained from male respondents will not be included in the project. Neither will we consider information on *ideal* family size, for which the interpretation is at the aggregate level, not at the level of the individual woman and her family. In case there is more than one survey for your country in which birth expectations data have been collected (for instance, several rounds in various years within the same organisation, or various surveys carried out by different organisations), please copy this form and fill out one copy for each such survey. You should not restrict yourself to surveys carried out by the statistical agency - the intention is to collect information from any nation-wide representative survey which includes birth expectations data.

General issues

1. What is the name of the survey in which data on birth expectations have been collected for your country? When were the interviews taken?

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2. Whom can be contacted in case of further queries regarding the survey?

   Name of contact person ---

   Address ---

   Phone/Fax nr. ---

3. Which population sub-groups did the sample consist of (all women, only native women, specific age groups, only married women, etc.)?

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4. If age or cohort were among the characteristics used to define the sample, which definition has been employed?

[ ] Age at time of interview
[ ] Age at December 31st of interview year
[ ] Birth cohort
[ ] Other (please specify) ----------

Birth expectations

5. Please give an English translation, as close as possible to the original wording, of the relevant question(s) regarding additional expected, total expected, preferred, desired, and/or wanted number of children/family size (examples are given below).

5.1 ----------

5.2 ----------

5.3 ----------

Example from Norwegian Family and Occupation Survey 1988

5.1 Do you expect that you will get one or more (additional) children?

5.2 How many children do you expect to have altogether?

Example from ECE Fertility and Family Survey (FFS)

5.1 How many children of your own do you want in all?

Ideally, we would like to use, when formulating fertility assumptions in population projections, information on the additional number of children each woman in the survey expects to have in the future. In case the survey included a question related to the additional number of children the woman expects to have in the future, as well as other questions on birth expectations, use data on additional expected number of children when answering the following questions. In case the survey did *not* include a question on additional number of children expected by the woman, state clearly whether your

answers to the following questions are based on 5.1, or 5.2 or 5.3 above. For reasons of simplicity, we shall continue to use the term "birth expectation".

The following answers relate to answer ------- on question 5 (fill in: 5.1, 5.2, or 5.3)

6. Has the survey question on birth expectations been asked to all respondents, or only to a selection of them (e.g. only to a certain age-group, to fecund women, to woman who stated that they wanted to have children at some time, to non-pregnant women, to married women, to women with a partner etc.)?

Sometimes, women who give a "don't know" answer to the birth expectation question are treated in a particular way in the analysis. For instance, they may just be left out. Or the non-responding women who already have at least one live-born child may be assigned a birth expectation equal to that of the responding women with the same number of children. A third possibility is to ask non-responding women if they can give a maximum and a minimum birth expectation. In answering question 7, please also give information on how non-responding women were treated.

7. Please give, on a separate sheet, average numbers of additional expected / preferred / desired/ wanted children, broken down by birth cohort or age of the woman (in one-year cohorts or age groups, if possible), as measured at interview date. Indicate clearly how pregnant women were treated. Please give also, with the same cohort/age detail as in the previous question, age-specific average numbers of live-born children that women already had at the time of the survey, and age-specific numbers of women included in the denominators of these averages.

   How were women treated who gave a "don't know" answer to the birth expectation question?

Example from Norwegian Family and Occupation Survey 1988

Average number of children born and expected in the future

	Average number of children			
	Live births	Expected in the future	Expected, total	Number of respondents
year of birth				
1968 and 1965	0.25	2.25	2.50	1254
1960	1.11	1.30	2.41	600
1955	1.86	0.36	2.22	548
1950	2.11	0.08	2.19	588
1945	2.25	-	2.25	541

8. Did the survey include a question into the *timing* of the next child (an example is given below)?

Yes/No

Example from Norwegian Family and Occupation Survey 1988
Approximately when would you prefer to have your first/next child?
answers: within 1 year/ 1-2 year/ 3-4 year/ 5 years or more/ no plans

If yes, please give average numbers of expected etc. children, as well as numbers of women involved, broken down by age of the woman and duration after interview date.

9. Has the representativity of the survey been checked, and if yes, how? Which groups were particularly over/underrepresented?

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10. How would you characterize the non-respondents (specific age groups, number of children, marital status, region of residence, urban/rural differences, etc.)?

Registered births

The following questions relate to live births *registered after interview date*. In principle, there are two approaches. First, the fertility behaviour of those women who participated in the survey may be measured *at the individual level*, for instance by means of a follow-up survey (panel survey), or by linking the birth register to survey records. A second possibility is to use *aggregate* birth registration data for those sub-groups of the whole female population which correspond to the sample (e.g. age, marital status etc.).

Question 11 relates to data at the individual level, whereas question 12 asks for aggregate level information. If possible, answer both questions 11 and 12. In case you cannot give information on individual level data, answer "no" to question 11, skip the rest and continue with question 12.

11. Do you have information on the fertility behaviour after the interview date of women who participated in the survey?

[ ] No
[ ] Yes, from linkage of birth registration to survey records
[ ] Yes, from a panel survey

If yes, could you give us any information you may have on the reliability of the birth expectations? For instance, it would be ideal to have a table of women by expected number of children (0, 1, 2+) cross-classified by number of children actually born after interview date (0, 1, 2+), controlling for expected and registered duration after interview, age or cohort, and number of children born before the interview took place.

If yes, has there been any analysis into the differences between expected and observed numbers of children, and what were the results (use a separate sheet, if necessary)?

---

12. Do you have information on the fertility behaviour after the interview date of the whole female population?

Yes/No

If yes, could you give us cumulated average numbers of live-born children at the time of interview for appropriate cohorts of the whole female population (depending upon the definition of the sample), as well as annual fertility rates for the first few years after the interview took place? Please indicate how the rates have been computed: period rates (a square or a rectangle in the Lexis diagram), or cohort rates (a parallelogram with horizontal sides) or period-cohort rates (a parallelogram with vertical sides). In case you have a choice, cohort rates are preferred when the sample was broken down according to women's exact age at interview date, and period-cohort rates are preferred when the sample was broken down by birth cohort.

Use of the birth expectations data in population projections

13. Have the birth expectations data been used in any population projection, even in an informal way?

[ ] Yes, in the projection with base year --------
[ ] No

If yes, please describe how birth expectations data were used in formulating fertility assumptions. If no, please indicate why (for instance, survey and projection were produced by different organisations, timing of survey and preparation of projection corresponded badly, reliability of birth expectations was considered low, etc.). Use a separate sheet if necessary.

Documentation

14. Could you please send us any material (tables, analyses, reports etc.) which might be helpful in studying the link between birth expectations and fertility assumptions?

Many thanks for your co-operation in answering these questions.

Table 1. The surveys for which information was sent in

Country	Name and date of survey	Organisation (contact person)
Austria	1. Mikrozensus, June 1991 2. Survey on Population Policy Acceptance, December 1992	Statistisches Zentralamt (Peter Findl) Institut für Demographie (Eva Nebenführ)
Belgium[1)]	NEGO V, April-October 1991	CBGS (Freddy Deven)
Finland	Woman's Life Course and Family Formation, September-December 1989	Statistics Finland (Timo Nikander)
France	1. Enquête Mondiale de Fécondité, December 1977 2. Enquête Mondiale de Fécondité, December 1987 3. Enquête sur les Situations Familiales et l'Emploi, March 199	INED (Laurent Toulemon) INED (Laurent Toulemon) INED (Laurent Toulemon)
Germany	Family and Fertility Survey, summer 1992	BiB (Katharina Pohl)
Italy	1. Indagine sulla Fecondità i Italia, 1979 2. Indagine ISTAT Multiscopo sulle Famiglia, 1988 3. Indagine sulla popolozione e politiche sociali in Italia, 1991	University of Padua (Paolo De Sandre) ISTAT (Linda Laura Sabbadini) IRP-Roma (Rossella Palomba)
Netherlands	Netherlands Fertility Survey 1982, 1988, 1993, beginning of each year	Statistics Netherlands (Wim van Hoorn)
Norway	1. Fruktbarhetsundersøkelsen, October-December 1977 2. Familie- og yrkesundersøkelsen, October-December 1988	Statistics Norway (Turid Noack) Statistics Norway (Turid Noack)
Spain	1. Fertility Survey 1977, November-December 2. Fertility Survey 1985, May-June	Instituto Nacional de Estadistica Instituto Nacional de Estadistica
Sweden	Family Survey, October 1992-March 1993	Statistics Sweden (Elisabeth Landgren Möller)
United Kingdom	General Household Survey 1991, April 1991-March 1992	OPCS (Janet Gregory)
United States	Current Population Survey, June 1971(1)1990, 1990(2)1994	US Bureau of the Census (Martin O'Connell)

Note: 1) Flanders only.

Table 2. Target population and representativeness

Survey[1]	Target population	Representativeness
Austria 1	Women aged 20-40	Young, urban, single women and non-nationals underrepresented
Austria 2	Women aged 20-54	Weighted according to age group, no non-response analysis
Belgium[2]	Native women aged 20-39	Young age groups are underrepresented
Finland	Women born 1938-1967 in private households	Helsinki region and cohorts 1938-1952 underrepresented
France 1	Women aged 20-44	Women over 35 without children underrepresented
France 2	Women aged 20-49	Weighted according to age and marital status, women without children underrepresented
France 3	Women aged 20-49	-
Germany	Women aged 20-39 of German nationality in private households	Weighted according to county, size of municipality, household size, age, and marital status
Italy 1	Non-single women aged 18-44	-
Italy 2	Resident women	Childless women are underrepresented
Italy 3	Resident women aged 18-64	-
Netherlands 1,2	Women aged 18-37	Weighted according to age, marital status, number of live-born children, nationality, and size of municipality
Netherlands 3	Women aged 18-42	Weighted according to age, marital status, number of live-born children, nationality, household position, and size of municipality
Norway 1	Women aged 18-44	Underrepresented are women aged 20-24 or 40-44, unmarried women, and women living in Eastern Norway

Table 2 (continued)

Norway 2	Women born in 1945, 1950, 1955, 1960, 1965, 1968	Overrepresented are women born in 1960 or living in Western Norway. Underrepresented are childless women born in 1945, 1950 or 1955
Spain 1	Non-single women aged 15-49 in private households	-
Spain 2	Women aged 18-49 in private households	-
Sweden	Women born in 1949, 1954, 1959, 1964, 1969	Non-response rates high among women in big towns, women with no income, among foreigners, and among non-married
United Kingdom	Women aged 16-49 in private households	Young women (16-24), women living in London, women living alone are underrepresented. Women living with dependent children are overrepresented.
United States	Women aged 18-34	Weighted according to age and race. Single women are underrepresented.

Notes: 1) Numbers refer to survey numbers in table 1.
2) Flanders only.

Table 3. Formulation of questions on birth expectations

Survey[1)]	Formulation
Austria 1	Do you intend to have a child/ further children in the future? How many children do you want altogether?
Austria 2	(Q26) Do you have the wish to get some time in your further life one or more (additional) children? Please add a current pregnancy. (Q27) If yes, how many additional children do you wish? (Q28) If (26) or (27) were answered with "don't know": If you are asked to give an approximate number, how many (additional) children do you wish to have? You may also give a number from-to.
Belgium[2)]	(Q624) How many children do you want at present? (Q626) Do you intend to have a/another child in the next three years (current pregnancy excluded)? (Q627) When?
Finland	(Q153) Do you plan to have any children in the future? If yes: (Q154) How many (more) children do you hope to have (including those you already have)? ONE NUMBER ONLY (Q155) In how many years from now would you like your first/the next child to be born?
France 1	Do you wish to get (additional) children? If yes, how many additional?
France 2	Do you wish to get (additional) children? If yes, how many additional? If don't know, how many more or less (-- or --)? In how much time do you want to have your next child?
France 3	Do you wish to get (additional) children? If yes or don't know, how many additional? If don't know, how many, more or less (-- or --)?
Germany	*For childless women* (Q602) Do you want to have children of your own some time? If yes, (Q603) how many children of your own do you want in all)? (Q604) At what age do you want to have your first child, at the latest? *For mothers* (Q605) Do you want to have another child some time? If yes, (Q606) how many more children do you want? (Q604/613) At what age do you want to have your first/next child, at the latest?

Table 3 (continued)

Italy 1	If you now were free to decide how many children to have in all your life, how many children would you like to have in total? According to a realistic evaluation, do you think you will have (more) children in the future? How many, presumably? When do you like to have your next child?
Italy 2	If you can choose absolutely freely, how many children do you wish to have in total? Practically, how many children do you think to have in total?
Italy 3	Do you think you will have one or one more child in the next five years?
Netherlands 1,2, 3	(Q147) Taking into account what you expect the future to bring, how many (more) children do you think you will have in the future? (Q153) In which year do you expect to have your first/next child?
Norway 1,2	Do you expect to have a child (additional children)? If yes, how many children do you expect altogether? Approximately when would you prefer to have your first/next child?
Spain 1	Do you want to have (more) children in the future (apart from a possible pregnancy)? How many (more) children do you want to have? In how many months, approximately?
Spain 2	Do you want to have (more) children in the future (regardless of the children you already have and of your present pregnancy, if such is the case)? How many children do you want to have in all? In how many months, approximately?
Sweden	As things are now, do you believe that you will have (more) children - either biological or adopted - at some time in the future? How many (more) children do you believe that you will have (in addition to those you already have)?
United Kingdom	On the whole do you think you will probably have any/more children, or you will probably not have any/more children? How many children do you think you will have born to you in all?
United States	Looking ahead, do you expect to have any (more) children? How many (more) do you expect to have?

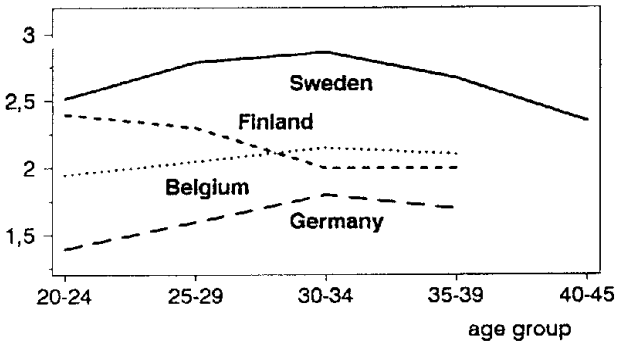
Notes: 1) Numbers refer to survey numbers in table 1.
2) Flanders only.

Table 4. Expected and observed number of children, Finland, France and Norway

Country	Year of interview	Women born in ...	Average number of children born at interview date	Expected number of children to be born during the period ...	Period	Observed number of births during that period
Finland	1989	1964-1965	0.40	1.05	1990-1992	0.40
Finland	1989	1966-1967	0.23	0.85	1990-1992	0.31
France	1987	1962	0.78	1.77	1988-1992	1.28
France	1987	1967	0.12	2.01	1988-1992	0.50
Norway	1977	1953-1959	0.41	1.98[1)]	1977-1993	1.53
Norway	1977	1943-1952	1.75	0.60[1)]	1977-1993	0.40
Norway	1988	1965 or 1968	0.25	1.3	1988-1992	0.4
Norway	1988	1960	1.11	1.1	1988-1992	0.5

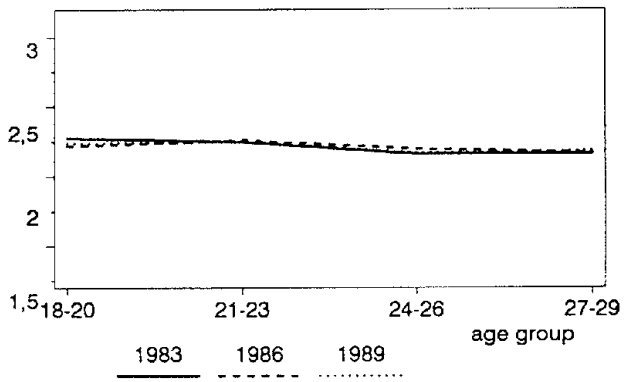
Note 1): Expected after interview date, no particular period specified.

1. Total expected number of children 1)

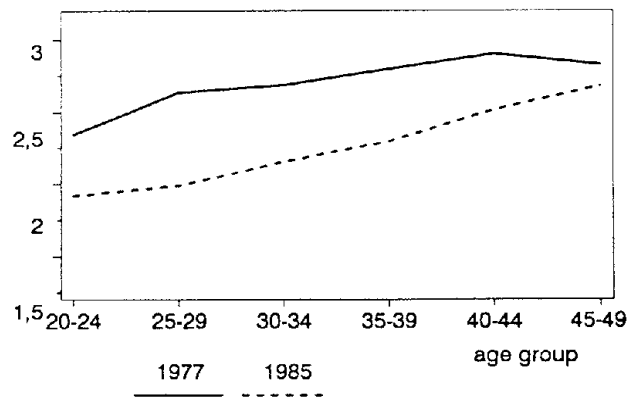


1) Only one survey available for above countries

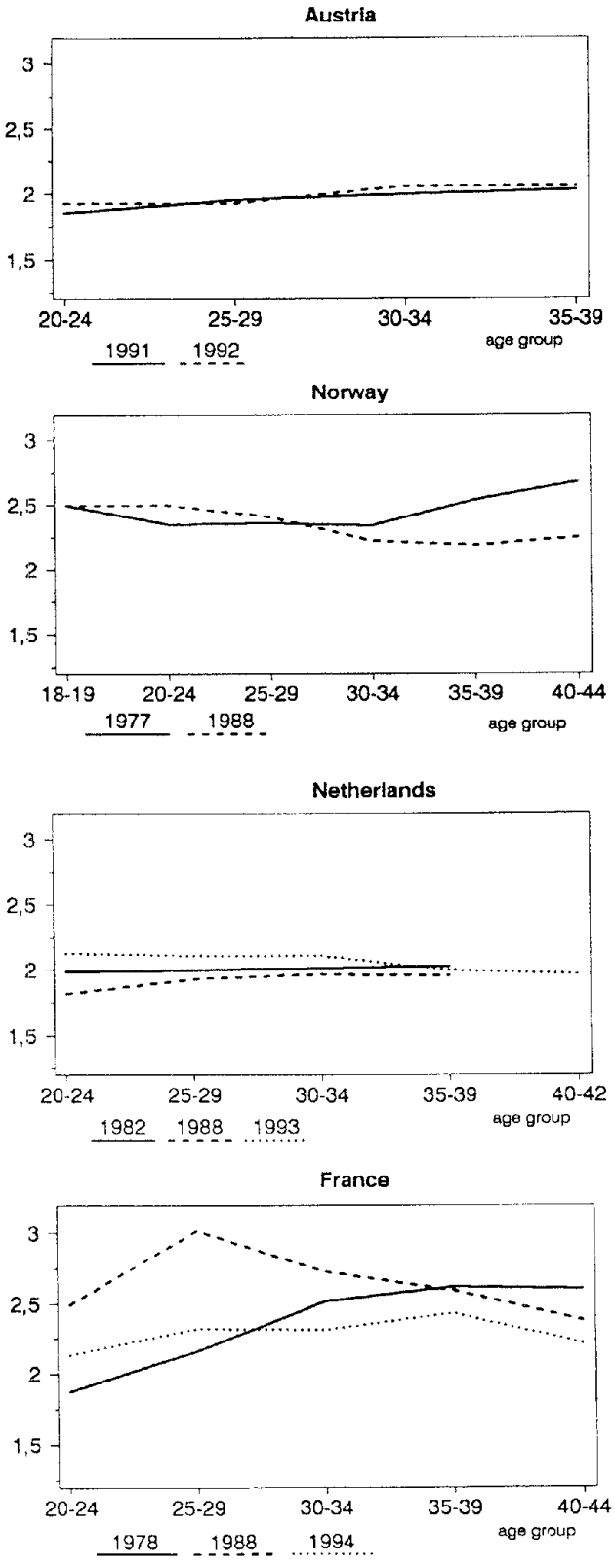
Great Britain



Spain

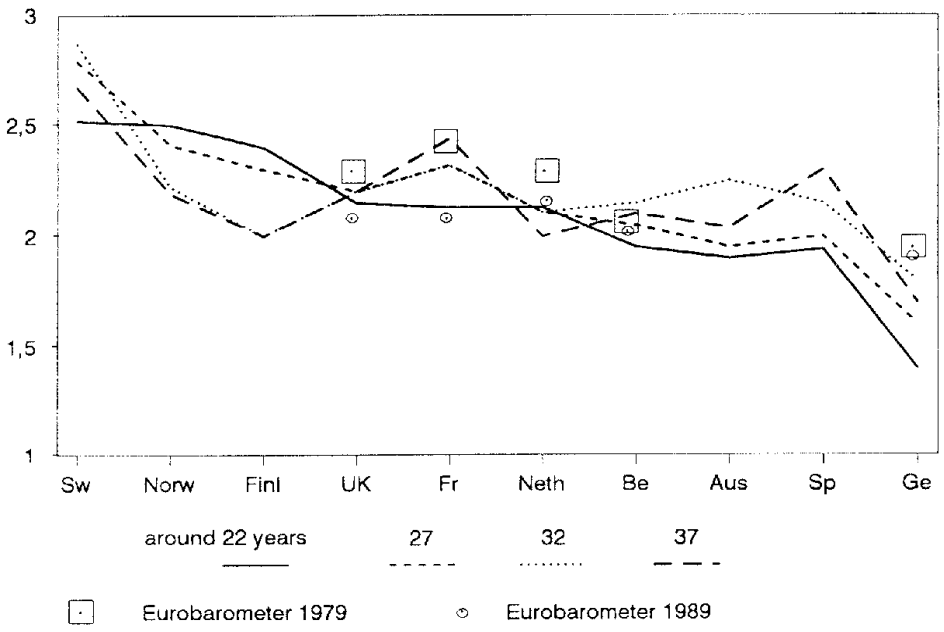


1. continuation

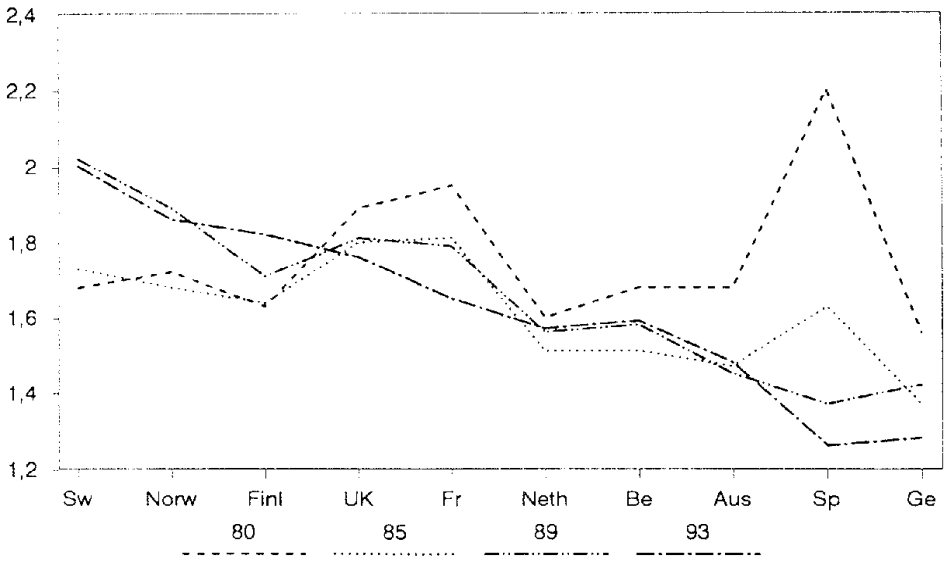


2. Expected total number of children

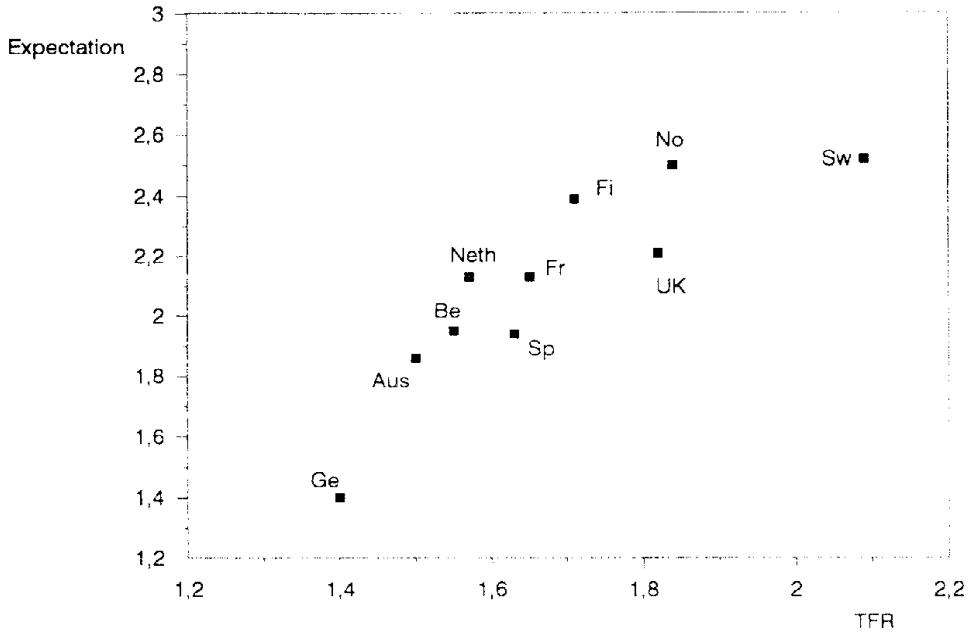
(most recent survey)



3. Total Fertility Rates in selected years



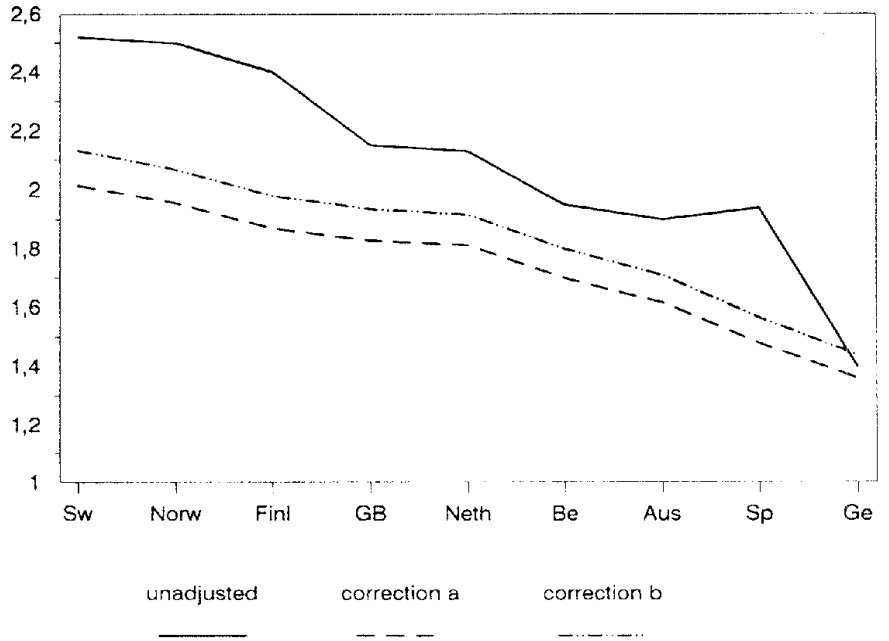
4. Association of Expected number of children and TFR at survey date 1)



1) age 20-24

5. Corrections of expected number of children

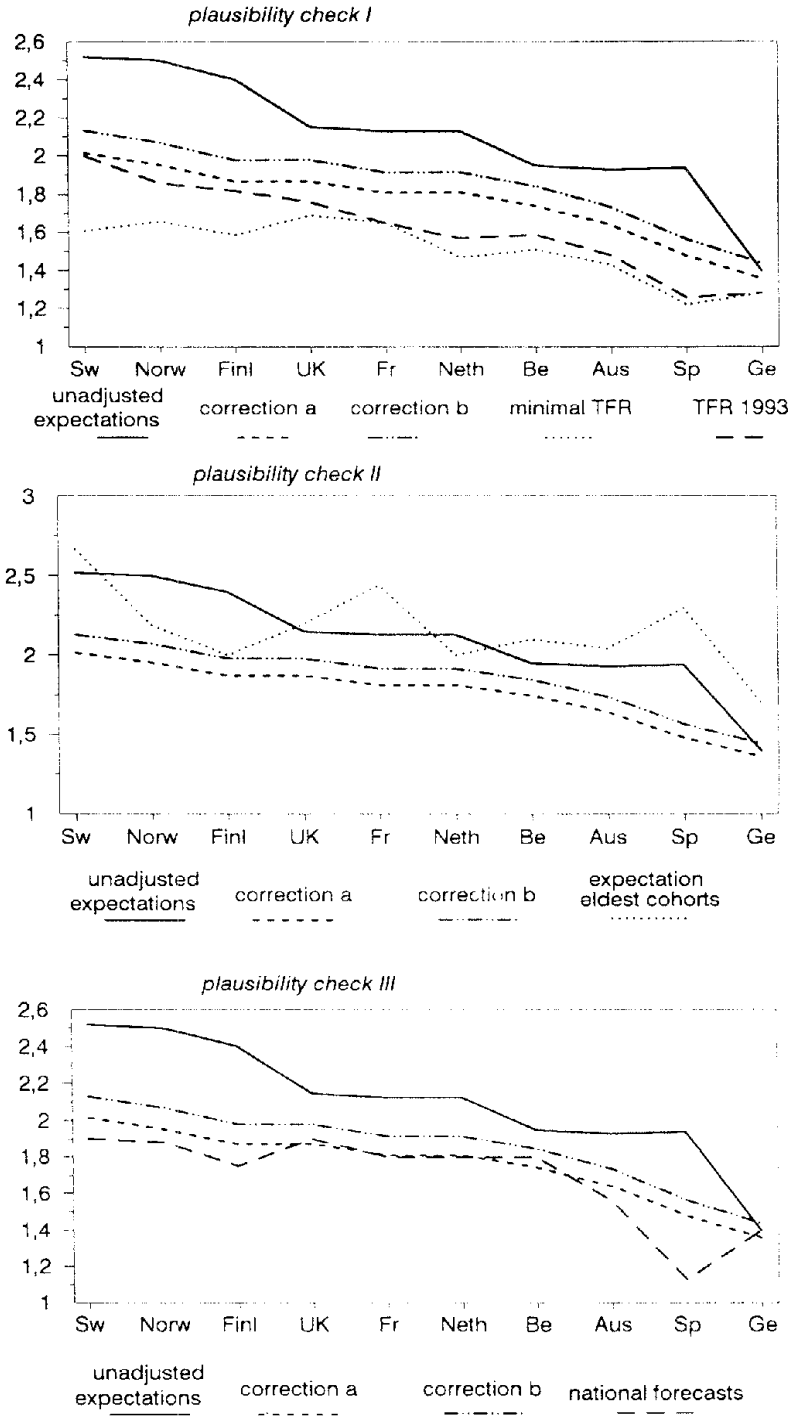
of the youngest cohorts (20-24)



1) correction for period-effect and limiting factors;

correction a: limiting factors: -15%;
correction b: limiting factors: -10%;

6. Checks of adjusted expected total number of children of youngest cohorts 1)



1) age: 20-24 years; correction a: for period-effect and 15% limiting factors; correction b: for period-effect and 10% limiting factors.

7. Adjusted expected total number of children for all age groups
(according to correction a)