SOCIODEMOGRAPHIC DIFFERENTIALS IN THE NUMBER OF CHILDREN

A STUDY OF WOMEN BORN 1935, 1945 AND 1955

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EMNEGRUPPE
21 Befolkning

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Barnetall
Fruktbarhet
Kohortanalyse

PREFACE

This is the first report from a project in which recent fertility trends are studied on the basis of data from the censuses and the Central Population Register of Norway. The project is carried out in the Central Bureau of Statistics with financial support from the Norwegian Research Council for Science and the Humanities. Comments from Helge Brunborg, Jens Christian Hansen, José Gomez de Leon, Per Sevaldson and Lars Østby on a first draft are gratefully acknowledged. Rita Elin Fjeldbo and Liv Hansen have assisted with typing of text and tables and drawing the figures.

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Gisle Skancke

CONTENTS

INDEX OF FIGURES

INDEX OF TABLES

SUMMARY

This report is devoted to a study of variations in the total number of children at ages 29 and 39 for women born in 1935, 1945 and 1955. The analysis is based on individual birth and marriage histories extracted from the Central Population Register of Norway. These biographies are linked with information from the three Population Censuses of 1960, 1970 and 1980.

Demographic characteristics like marital status and age at first marriage are important determinants of fertility. Women who enter a marital union in their teens or early twenties have more children by age 39 than women who marry in their late twenties. Fertility among never married has escalated during the last twenty years, but is still, of course, considerably lower than among women who have married. Those who have experienced a permanent or temporary dissolution of their first marriage have slightly fewer children by age 39 than other women. However, the increasing number of divorces in Norway during the last two decades only explains a very small part of the total fertility decline in this period. The recent reduction of fertility among women younger than 30 years old is closely related to the postponement of first marriage and first births. Consensual unions in which fertility is low have emerged as an alternative to the engagement period and the initial stage of formal marriage.

The sociodemographic factors that we have inspected appear to have largely the same effect on fertility in all three birth cohorts. In other words, the decline in fertility seems to be a result of a process that has taken place in all the social and regional groups under consideration. There are a few exceptions, though: The decrease in the total number of children has been somewhat lower than average in Southern Norway and somewhat higher in Northern Norway. It has also been relatively low among women with a university degree.

Educational attainment is substantially higher for the 1955 cohort than for women born ten years earlier. More and more women have received a secondary or higher education, which, in turn, is associated with a higher age at marriage, a higher proportion of never married at age 29, and fewer children by that age. A decomposition technique reveals that this drift towards higher educational levels accounts for about 40 per cent of the fertility decline from the 1945 to the 1955 cohort.

Some examples of sociodemographic fertility differentials are briefly reviewed below. The focus is on the total number of children at age 39 for women born in 1945.

In the rural areas of Northern Norway the average fertility is 2.80, whereas it is only 1.96 in the non-rural areas of Eastern Norway. In these calculations the women are grouped according to place of residence at age 35. Apparently, the place of residence at age 15 exerts a much smaller influence on fertility.

Educational fertility differentials have also been examined. Women with only a primary eduaction have an average of 2.38 children, while those who have earned a university degree by age 35 have 1.80 children. The small group with a Master's degree have only 1.64 children. These differences are primarily due to a larger proportion of never married among those with a high education, and a higher age at marriage. Among women who have married at the same age there is only a very weak relation between number of children and educational level.

The data set does not permit an elaborate examination of the association between religious affiliation and fertility, but we have observed that the small

group of couples who are affiliated to religious denominations other than The Norwegian Church have 0.6 children more than other couples.

We have also found that nurses, women working in the agricultural sector and charwomen have higher than average fertility, while administration and clerical work is associated with low fertility. These differentials are particularly difficult to interpret, however. Occupational status at age 35 may just as likely be a result of family size as an explanation.

Husband's occupation is also associated with fertility, though somewhat less closely. For instance, the medical profession and agriculture ,are both positively related to the number of children, while clerical work is negatively related.

There appears to be no relation between the family size of a 39 year old woman and her husband's income four years earlier.

SAMMENDRAG PÅ NORSK

I denne rapporten studeres variasjoner i det totale barnetall ved 29- og 39-årsalderen for kvinner født 1935, 1945 og 1955. Analysen er basert på individuelle fødsels- og ekteskapshistorier, som er bygd opp på grunnlag av data fra Det Sentrale Personregisteret. Disse livshistoriene er koblet sammen med informasjon fra Folketellingene 1960, 1970 og 1980.

Demografiske kjennetegn som ekteskapelig status og alder ved første giftermål er viktige forklaringsfaktorer når det gjelder fruktbarhet. Kvinner som gifter seg i tenårene eller tidlig i tyveårene har flere barn som 39-åringer enn de som gifter seg sent i tyveårene. Fruktbarheten blant kvinner som aldri har vært gift, har steget sterkt i løpet av de siste 20 år, men er selvfølgelig fremdeles betydelig lavere enn for gifte kvinner. De som har opplevd en permanent eller midlertidig oppløsning av sitt første ekteskap, har litt færre barn når de er 39 år enn andre kvinner. Økningen i skilsmissetallet i Norge gjennom de siste 20 årene forklarer imidlertid bare en meget liten del av fruktbarhetsfallet i denne perioden. De siste års reduksjon av fruktbarheten blant kvinner under 30 år henger nøye sammen med utsettelsen av første ekteskap og første fødsel. "Papirløse" samliv med lav fruktbarhet har etablert seg som et alternativ til forlovelsestiden og den første delen av ekteskapet.

De sosiodemografiske faktorene vi har studert, ser ut til å ha omtrent samme virkning på barnetallet i alle de tre fødselskohortene. Med andre ord er fruktbarhetsfallet tilsynelatende resultat av en prosess som har funnet sted i alle de sosialgrupper og regionale grupper vi har betraktet. Det er imidlertid noen få unntak: Reduksjonen i barnetallet har vært litt mindre enn gjennom-snittet på Sørlandet og litt større i Nord-Norge. Reduksjonen har også vært relativt liten blant kvinner med universitets- eller høyskoleutdanning.

Utdanningsnivået er gjennomgående betydelig høyere for 1955-kohorten enn for kvinnene født 10 år tidligere. Flere og flere har tatt utdanning ut over det obligatoriske, som igjen er forbundet med høyere giftermålsalder, flere ugifte ved 29-årsalderen og færre barn ved denne alderen. En dekomponeringsteknikk har vist at utviklingen mot et høyere utdanningsnivå bidrar til 40 prosent av fruktbarhetsfallet fra 1945 til 1955 kohorten.

Noen eksempler på sosiodemografiske fruktbarhetsforskjeller er referert nedenfor. Oppmerksomheten er rettet mot det totale barnetall ved 39-årsalderen for kvinner født 1945.

I de spredtbygde delene av Nord-Norge er det gjennomsnittlige barnetallet 2.80, mens det bare er 1.96 i de tettbygde delene av Østlandet. I disse beregningene er kvinnene gruppert etter sitt bosted i 35-årsalderen. Det ser ut til at det stedet de bodde da de var 15 år, er mye svakere relatert til barnetallet.

Forskjellene mellom utdanningsgruppene er også studert. Kvinner som bare har grunnskole, har i gjennomsnitt 2.38 barn, mens de som har tatt en universitetsgrad før de er 35 år, har 1.80. Den lille gruppen med eksamen på hovedfagsnivå har bare 1.64 barn. Disse forskjellene skyldes primært en større andel ugifte blant de med høy utdanning, og en høyere giftermålsalder. Blant kvinner som gifter seg i samme alder, er det bare en meget svak sammenheng mellom barnetall og utdanningsnivå.

Datamaterialet tillater ikke noen grundig analyse av sammenhengen mellom trossamfunn og fruktbarhet, men vi har funnet at den lille gruppen av par som

tilhører et annet kirkesamfunn enn Den Norske Kirke, har 0.6 flere barn enn andre par.

Vi har dessuten funnet at sykepleiere og kvinner som arbeider i jordbruket eller med rengjøring har flere barn enn gjennomsnittet, mens administrasjon og kontorarbeid er forbundet med lav fruktbarhet. Disse forskjellene er imidlertid spesielt vanskelige å tolke. Yrke ved 35-årsalderen kan like gjerne være en effekt av familiestørrelsen som en forklaring.

Det er også en sammenheng mellom ektemannens yrke og fruktbarheten. For eksempel har menn som driver med medisinsk arbeid eller jordbruk forholdsvis mange barn, mens kontorarbeid er forbundet med et lavere barnetall.

Det er tilsynelatende ingen sammenheng mellom familiestørrelsen for en kvinne i 39-årsalderen og hennes manns inntekt fire år tidligere.

1. INTRODUCTION

1.1   Register based fertility research: main objectives

The analysis presented in this report is part of a larger research project, in which population register and population census data are used in an attempt to gain further insight into current fertility trends in Norway. We will not give a thorough motivation for this project, but content ourselves   with briefly outlining the Norwegian setting and explaining the need for research efforts within the field of reproductive behaviour.

The total period fertility rate for Norwegian women fell from 2.98 in 1964 to 1.66 in 1983, and has subsequently increased slightly, to 1.75 in 1987. In a cohort perspective the changes have been less marked, but are nevertheless of substantial importance for the future population size and age structure. While women born in 1935 had more than 2.5 children on average - which is the highest figure recorded for any birth cohort in this century - those born in the 1950s will probably reach the end of their fertile period with only 1.8-1.9 children each. Disregarding the effect of in- and out-migration, a fertility level lower than 2.1 will in the long run reduce the total size of the population. In addition, past and future fertility trends are the crucial determinants of the age structure. Low fertility results in a larger proportion of old people in the future.

Our project   attempts to throw more light on the changes in reproductive behaviour during the last two decades. One of the main objectives is to see whether the decline in fertility has occurred in parallel in most groups of the Norwegian population, or whether some groups deviate much from the average trend. An improved understanding of these matters may guide us when making popu- lation projections. Besides, identifying groups with high or increasing fertility may suggest ideas for conducting a pro-natalistic population policy - should a political initiative in this direction ever be taken.

Although our main focus is on the dynamic aspects, we also believe that intracohort fertility differentials are of some interest. In the present analysis several explanatory variables are considered in order to get a better insight into contemporary reproductive behaviour.

We believe that our register-based analysis, which exploits a very rich data set with individual information for **complete** Norwegian birth cohorts, will provide insights that cannot be gained from future studies of the Family and Occupation Survey 1988, where there are only a few thousand respondents. In this survey complete biographies of pregnancies, conjugal unions, educational activities and occupational status have been collected, along with information on family values, religiosity etc. at the time of interview. The sample comprises 5000 women and 2000 men. Our analysis should also be considered as a preparatory work, as the results may give rise to questions than can be addressed in the comprehensive research program related to the Family and Occupation Survey.

1.2 Scope of this report

We recognize the importance of a sequential approach in fertility studies. As argued by Namboodiri (1972) and others in their criticism of the early

contributions to economic fertility modelling, decisions regarding family-building are taken step by step and influenced by the outcomes of previous decisions. We believe that considerable attention should be devoted to studies of transitions from one parity to another and to studies of other important steps in the family-building process (first marriage, first cohabitation, union dissolution etc.). Within such a framework life table models would be an important analytical instrument. In our project we give high priority to this kind of analysis, but as it tends to yield a somewhat fragmentary knowledge, we believe that an alternative approach may be more preferable in the initial stage of the project. In this first report we have therefore chosen a very simple methodological framework and focus on the total number of children among women born in 1935 and 1945, who have largely terminated their childbearing. The total number of children includes all liveborn children. (Children who are adopted are registered with their social mother.) A younger cohort (1955) is included for comparison and in order to study the most recent trends. Some consideration is also given to childlessness.

A simple exploratory analysis like this does not contribute much to the understanding of the complex mechanisms underlying human procreation, but it serves as an important preparation for future research on fertility in Norway, and fills a gap in the Norwegian demographic literature.

At the outset this report was supposed to be only a small part of our project, but more and more topics have been added, which, unfortunately, has led to the final version being somewhat muddled.

1.3 Variables included in the analysis

The analysis of cohort fertility reflects our view that a variety of factors are likely to play an important role. Previous research has demonstrated the relevance of family income and opportunity costs of childbearing (e.g., Becker, 1960; Mincer, 1963; Willis, 1973), size of the parents' cohort and social class dependent "tastes" for children (e.g., Easterlin, 1969), income compared to that in the parents' social reference group (Leibenstein, 1975), social norms (e.g., Davis and Blake, 1956; Freedman, 1975; Lesthaeghe, 1987), psychological needs (e.g., Fawcett, 1973; Fishbein, 1972), contraceptive use (e.g., Westoff and Ryder, 1977), fecundity (e.g., Leridon, 1977), etc.

We have not given preference to one particular theoretical fertility model, but have simply studied the association between the total number of children and a variety of sociodemographic factors that are likely to have some explanatory power. Our selection of variables is, of course, very restricted, as the available data source only contains a few standard demographic and socioeconomic characteristics collected in the Population Censuses and the Central Population Register. Unfortunately, there is no information on, for instance, family values. The description of economic factors like income, occupation and labour force participation is also fairly inadequate, as we only have access to some cross-sectional information (see discussion in chapter 3).

A major part of our attention has been devoted to studies of marital status, education and place of residence as determinants of procreation. Since the study is based on officially registered events, we have to restrict ourselves to formal marriages. Women who live in consensual unions are considered as not married. We also assess the impact on fertility of the occu-

pation of both spouses, their income and their religious denomination - though
not very elaborately. The educational attainment of the woman's parents and that
of her husband are also considered.

In this report we have used multivariate regression models as well as simple
mean value calculations. We hold the view that it is important to examine
variation in fertility by multivariate models, as the factors included in the
analysis may be correlated. For instance, the estimated effect of educational
level when it is controlled for age at marriage is likely to be quite different
from the effect obtained by more simple, univariate calculations. In some
contexts the former is the most interesting result, in other contexts the
latter.

1.4 An important supplement to the Norwegian demographic literature

We believe that our report will add considerably to the knowledge of current
Norwegian fertility trends. The trends on a national level have been fairly well
described in purely demographic studies (Brunborg and Kravdal, 1986; Brunborg,
1988), and there is also a good knowledge of regional period fertility rates
from official statistics (e.g., Central Bureau of Statistics, 1987). However,
the regional variations have not been studied from a longitudinal perspective
since the Fertility Survey 1977 (Noack and Østby, 1981).

With respect to educational fertility differentials and the effects on
fertility of other social characteristics, there is very little information for
the years after 1977, but much research has been conducted with data from the
Fertility Survey. Jensen (1981, 1983) has inspected the association between
fertility, female labour force participation and some sociodemographic
variables. She has paid particular attention to the influence of the woman's
educational attainment. In his econometric studies of fertility Brunborg (1984)
has taken several variables from the Fertility Survey into account.

In the Fertility Survey 1977 there was a representative sample of about
4000 women born 1933-1959. The conclusions drawn from a sample of this size do
not always rest on a statistically solid base, so a register-based analysis
covering the same historical time is a valuable supplement.

Finally, we refer to previous studies of the married segment of the
population. In Dyrvik (1976) and the Central Bureau of Statistics (1988)
fertility among currently married women is analysed with data from the
Population Censuses. These works provide considerable insight into social and
regional variations in family size.

We have to admit that our analysis probably arouses less interest among
foreign scholars, as most of the empirical relations we examine are already well
established in other countries and reported in the literature. Truly, our data
are quite unique, as they contain individual life histories for complete birth
cohorts. In the present analysis, however, we have not fully exploited the
potential of these biographies, as we have focused on the total number of
children for women in different age groups, and a large part of the analysis is
confined to married or previously married couples. Detailed studies of "children
ever born" are carried out in, for instance, the United States for ever married
women, with data from the Population Censuses (see e.g., Kiser et al., 1968). In
the United States there has also been developed a so-called "own children"
technique which yields good estimates of total period fertility (including

extramarital fertility) for the years around the Censuses. This is utilized in studies of sociodemographic variations in fertility (see e.g., Cho et al., 1970; Sweet and Rindfuss, 1983). The occupational fertility differentials, for instance, are scrutinized.

1.5 How to read the report.

Chapter 2 describes the data file and defines the variables included in the analysis. In chapter 3 some methodological considerations are presented. The empirical results for the cohorts 1935, 1945 and 1955 are presented in the chapters 4 - 8. The chapters 4 - 7 are organized along the same lines, except that the analysis of fertility at age 39 for the 1945 cohort (chapter 5) is more detailed than for other ages and other cohorts. Several tables are introduced, but we believe that at least some of them may deserve a more detailed inspection than those we have carried out. We therefore invite other demographers to utilize them in their own work. In chapter 9 we summarize and discuss the findings. Several references will be made to other empirical studies. This chapter may be read separately, without having to plunge into the details of chapters 4-8.

2. DATA

Our analysis is based on birth and marriage histories extracted from the Central Population Register of Norway (the "Woman File" described by Kravdal, 1986) and matched with information from the three latest population censuses (1960, 1970 and 1980). This file comprises information on all women born 1935-1965, and their birth histories are almost complete up to the end of 1984 (Brunborg and Kravdal, 1986). In principle, all liveborn children are registered, as well as the children the woman has adopted. A few are left out, however - primarily the children born before 1964. The marriage histories are not complete for women born 1935-1945, as we do not know the exact date of marriage for those who married prior to 1964, when the Central Population Register was established. Fortunately, we know the year of marriage for women who were still married in 1970, but not for those who had already divorced, separated or become widows at that time.

The Lexis diagram in figure 2.1 indicates our observation plan. We follow three complete female cohorts born in 1935, 1945 and 1955. The birth and marriage histories are known except for the shortcomings just referred to. Place of residence and some socioeconomic characteristics can be established from the censuses, but we have no continuous history of these characteristics. This imposes some restrictions on our analysis.

Women in the 1945 cohort had largely terminated their childbearing by the end of 1984, when they were 39 years old. We do not know their educational level or other socioeconomic characteristics at this time, but information from the 1980 census (marked with a square in figure 2.1) is available. For some variables, like education, the 1980 and 1984 level is probably identical for most women, whereas other variables are more likely to have changed during these five years. With respect to place of residence the data set allows us to focus on age 39, but we preferred the age of 35 since all other background factors are defined at that age.

The women born in 1955 can only be observed until the age of 29. We use the 1980 census to group them by education (that is, the level they had when they were 25 years old), place of residence, etc. To compare the 1945 and 1955 cohort the number of children must be calculated at the same age. We have therefore made additional estimates for the 1945 cohort at age 29 (in 1974) using information from the 1970 census to establish social and regional characteristics. This gives us three groups of women. The fourth group consists of women born in 1935 and aged 39. Also for this group we use the 1970 census.

As our intention was to examine variations in total number of children by fairly simple methods, we left out all women who were not living in the country at the end of 1984. We also excluded women who were not present in all the three censuses 1960, 1970 and 1980. Thus, there are very few missing values for the social and regional characteristics. Apparently, this procedure does not give rise to serious selection problems. We have inspected tables based on the complete cohort as well as on the described sub-population, and have observed that there are only minor differences.

We now provide an example of the population sizes: In 1945 29139 baby girls were born. During the years from 1945 to 1984 there was also an immigration of women who had been born in 1945, mainly during the 1970s and the 1980s. We have

not calculated the exact figure, but, roughly estimated, it is 4-5000. The number of emigrants has been somewhat smaller than the number of immigrants, but due to a few hundred deaths, the 1945 cohort had approximately the same size in 1984 as in 1945. 29425 women born in 1945 lived in Norway at the end of 1984. About 2000 of these women had lived in other countries at the time of one of the censuses. Therefore, our reduced population comprises only 27213 individuals. The fact that the population is reduced by 2000, which is a much smaller figure than the estimated number of immigrants, might seem to be a paradox. One should be aware, however, that a large proportion of the immigrants were Norwegians who had emigrated a few years previously.

For 926 women in the 1935 cohort and 516 in the 1945 cohort we do not know the year of marriage. This is primarily because they have married prior to 1964 and divorced or separated before the 1970 census. These women are excluded from some parts of the analysis, but this has only a small impact on the estimated model parameters.

Figure 2.1 Lexis diagram showing cohorts and ages for which the
number of children is calculated
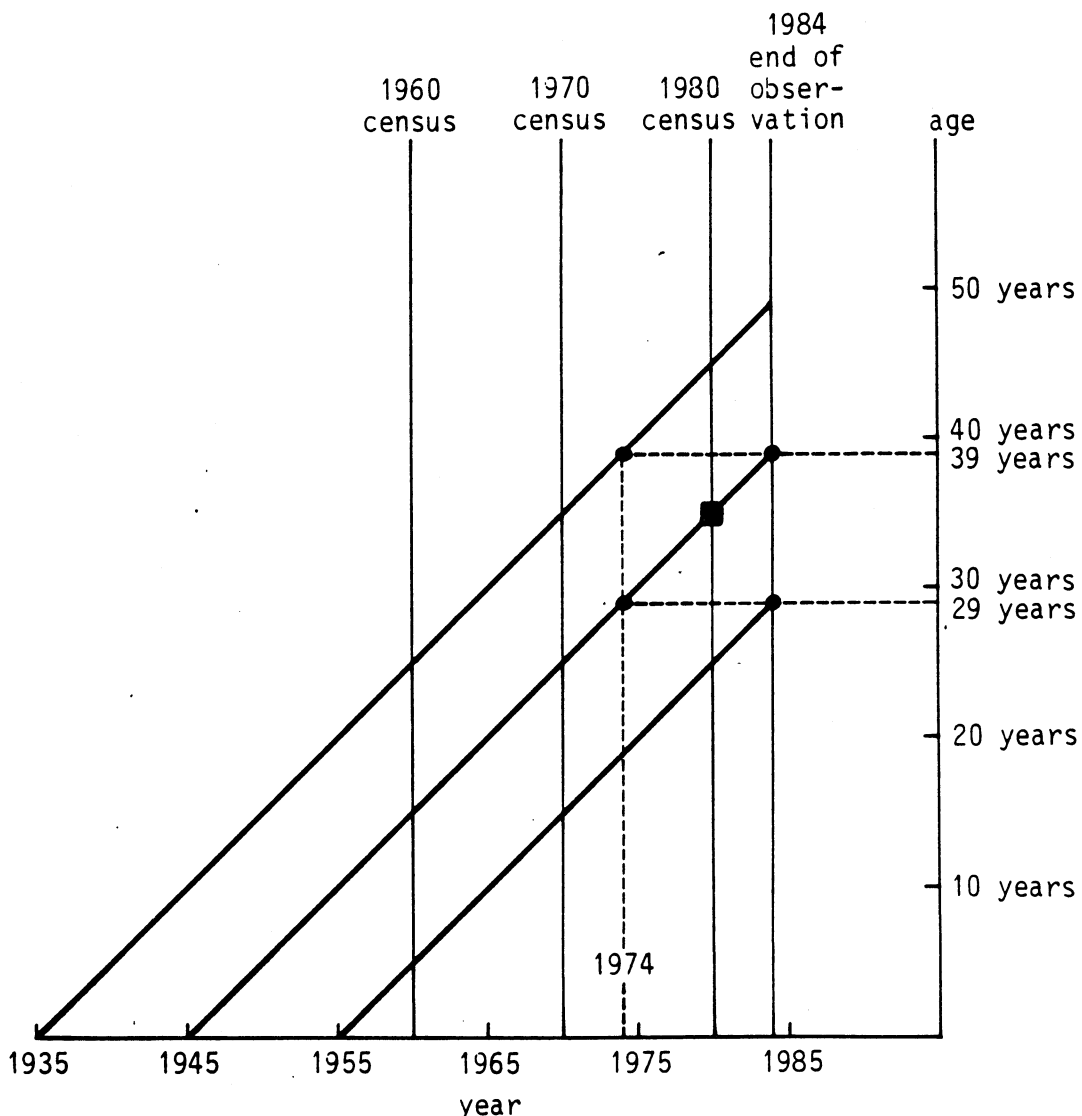
Several variables are included in our analysis, but of particular importance are education and place of residence. For _education_ we use 6 categories (the codes 2-7 are Norwegian standard; see e.g., Vassenden, 1987):

2: Compulsory education (7-9 years school attendance)
3: Lower secondary education (10 years school attendance)
4: Upper secondary education (11-12 years school attendance)
    e.g. "eksamen artium"
5: Higher education (13-14 years school attendance)
    e.g. nurses, teachers in primary school
6: Higher education (15-16 years school attendance)
    e.g. university bachelor's degree
7: Higher education (17-18 years school attendance)
    e.g. university master's degree

A few persons have a higher level (doctoral degree) or a missing value for the education variable. They are excluded from the analysis.

The _regional_ variable has 10 categories. The following 5 main regions are used (see figure 2.2):

Østlandet (Eastern Norway) :consisting of the counties Østfold, Akershus, Oslo, Hedmark, Oppland, Buskerud, Telemark

Sørlandet (Southern Norway) :consisting of the counties Aust-Agder, Vest-Agder, Rogaland

Vestlandet (Western Norway) :consisting of the counties Hordaland, Sogn og Fjordane, Møre og Romsdal

Trøndelag (Middle Norway) :consisting of the counties Sør-Trøndelag, Nord-Trøndelag

Nord-Norge (Northern Norway):consisting of the counties Nordland, Troms, Finnmark

For each of these regions there is a division into non-rural and rural districts (places classified as non-rural are settlements with at least 200 inhabitants and usually less than 50 meters between residences).

The _marital history_, which is also a very important element of our study, is handled in a very simple way. We have focused on the ages 29 or 39, and have defined women who have never been married at those ages as one group. The remaining women are divided into two groups: The first consists of those who still live in their first marriage and who have not experienced a marital break-up (separation, divorce, widowhood). The other group are the women who have experienced a permanent or temporary dissolution. They may presently be living in their first marriage (having reentered the marital union after a separation), they may be divorcees or widows, or they may have remarried. In brief we often refer to these three groups as

1: never married
2: stable unions
3: (women who have experienced a marital) break-up

Unfortunately, our data set only gives information on _formal_ marital status. For instance, never married couples living in a consensual union, which is becoming a very common life-style in Norway, are classified as never married.

Other essential variables are <u>age at marriage</u> (in years), <u>number of years in</u> <u>marriage</u> and <u>timing of first birth relative to marriage</u>. We believe that it is unnecessary to describe these variables in detail.

Figure 2.2 The five main regions of Norway

Nord-Norge
Northern Norway

Trøndelag
Middle Norway

Vestlandet
Western Norway

Østlandet
Eastern Norway

Sørlandet
Southern Norway
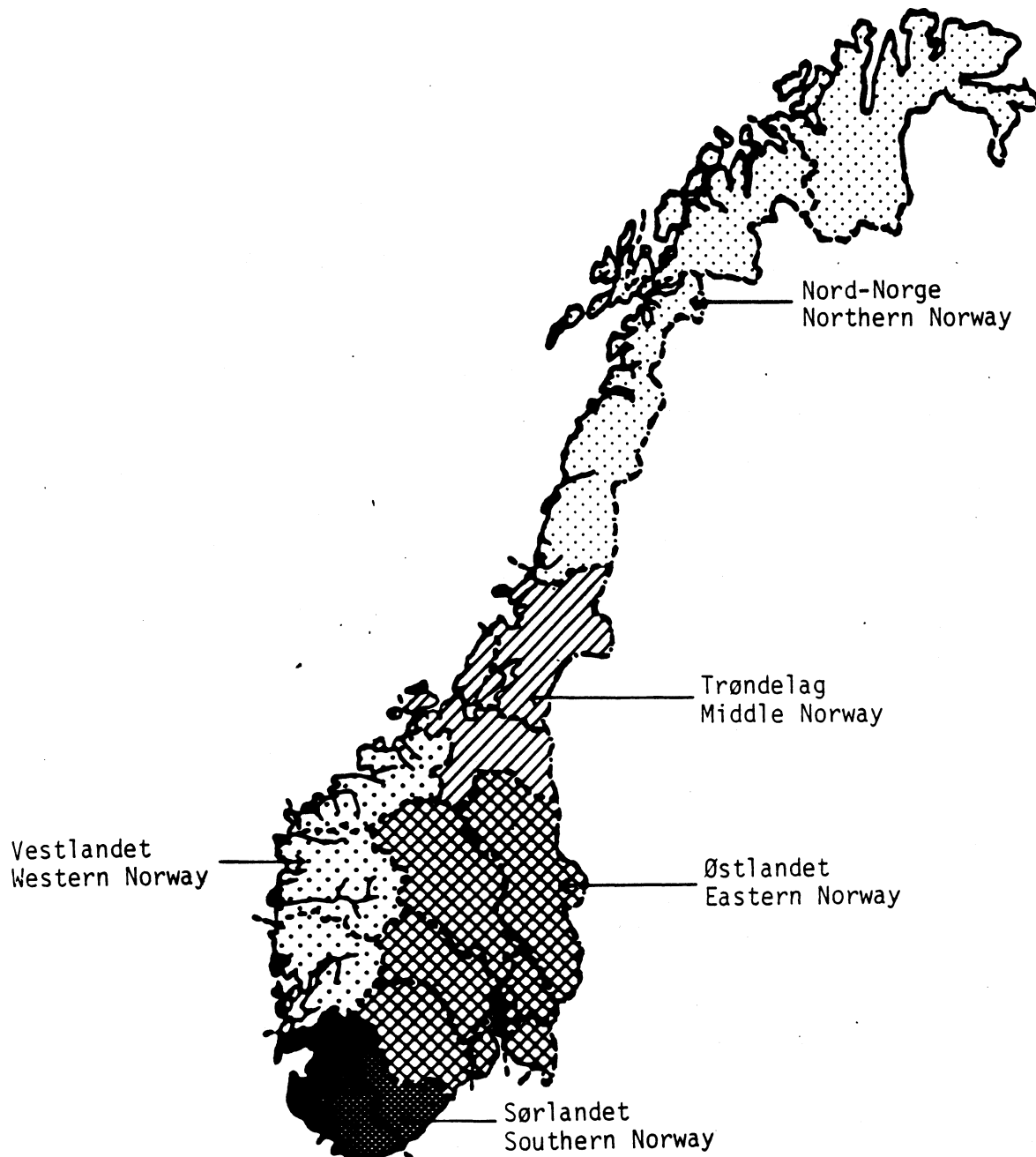
A few calculations in this report also include some other socioeconomic variables. The occupation for both husband and wife are among these. Categorizing the occupational groups is no easy task, and we have not given a very high priority to this, as our main socioeconomic variable is education. The final categorization that we have chosen, is based simply on some initial

test calculations as well as experience from other studies of demographic components (mortality, fertility, divorce).

For the <u>woman's occupation</u> we have chosen the following categories. Reference to occupational standard codes (see e.g., Vassenden, 1987) is in parentheses.

Not in the labour force (working less than 100 hours per year):
  1:
In the labour force:
  2: technical, scientific, juridical work (codes 0-02,08)
  3: artistic, literary work (code 09)
  4: medical work (codes 03-05)
  5: pedagogical work (code 06)
  6: administration (codes 10-11)
  7: clerical work (codes 21-29)
  8: sales, commerce (codes 30-39)
  9: agriculture, fishing (codes 40-49)
  10: graphic work (code 80)
  11: industry, craft (graphic work excluded) (codes 70-89, minus 80)
  12: hotel and restaurant work (codes 91-92)
  13: house porter, charwork (code 95)
  14: all other occupations

Code 1 and 14 also includes some women with unknown occupation.

For the <u>husband's occupation</u> we have these categories:

Not in the labour force (working less than 100 hours per year) or information on husband missing:
  1:
In the labour force:
  2: technical, scientific, juridical work (codes 0-02,08)
  3: artistic, literary work (code 09)
  4: medical work (codes 03-05)
  5: pedagogical work (code 06)
  6: religious work (code 07)
  7: administration (codes 10-11)
  8: clerical work (codes 21-29)
  9: sales, commerce (codes 30-39)
  10: agriculture, fishing (codes 40-49)
  11: transport (codes 60-66, 69)
  12: wood work (code 77)
  13: graphic work (code 80)
  14: industry, craft (graphic, wood work excluded) (codes 70-89, minus 77,80)
  15: hotel and restaurant work (codes 91-92)
  16: house porter, charwork (code 95)
  17: all other occupations

Code 17 also includes some men with unknown occupation.

For husband's occupation there are 3 categories (religious work, wood work, transport) that are not included for women. The reason is that very few women are engaged in these activities.

The categories 2-6 (for men) are often referred to as "technical, scientific, humanistic and artistic work" (first digit of the codes are 0). A rather fine division into 5 categories - some of them even quite small - was made because groups 2,3 and 6 appeared to deviate considerably from groups 4 and 5 according to some simple univariate models. Furthermore, we chose 4 and 5 as separate groups because they both comprise a fairly large proportion of the female population.

The categories 7-14 (for men) were selected on the basis of the first digit of the occupational standard codes with a few exceptions: A group of men working with post and communication (codes 67, 68) were put in the group "other occupations", so that the remaining part of group 11 could simply be labeled "transport". We did not single out sea transport, which in other demographic studies has proved to be a group behaving somewhat differently form the rest of the transport category. This was because our preliminary estimates showed no difference.

For the large group with first digit 7 or 8 (industry and craft sector) we made some initial univariate calculations in order to gain an impression of the variation between the sub-groups. As mortality and divorce rates are particularly low among carpenters and other men working with wood (Borgan and Kristofersen, 1986; Kravdal and Noack, 1989), we suspected that wood work might be associated with a fertility level differing from the rest of the industry and craft sector. This hypothesis was confirmed, and we also found that graphic work deviated from the average in the opposite direction. These two groups appeared to have maximum and minimum fertility levels within the industry and craft sector, and were therefore separated from the rest of the sector.

From the service sector (first digit 9) we selected men and women working in hotels and restaurants, as it is reported that they have particularly high divorce and mortality rates. We also defined a separate group of persons working as house porters or within charwork, as the initial calculations indicated that they have a higher fertility than others in the service sector.

Other variables that have been included are the husband's education, the couple's religion and the parents' education. The categories for the couple's religion are:

    1: both spouses are members of the Norwegian church
    2: both spouses are members of another religious society
    3: none of the spouses are members of a religious society
    4: all other combinations, including missing value

For husband's education we have the following categories:

    1: unknown
    2: compulsory (level 2)
    3: medium   (level 3,4,5)
    4: high   (level 6,7)

In the models where the characteristics of the husband are considered, only women who were married at age 29 or 39 and had not experienced a dissolution of their marriage (so-called "stable couples") are included. Some of these women have a missing value for husband's characteristics at age 25 or 35. This usually implies that they were not yet married at that time, and consequently that they tend to have lower fertility at age 29 or 39, respectively.

For the parents' education (determined from the 1960 census) we have these categories:

1: education unknown, often because the woman was not living with any of the parents in 1960

The highest educational level either parent has attained is

2: compulsory (level 2)
3: medium (level 3,4,5)
4: higher (level 6,7)

For woman's income and husband's income (the part of the income from 1 November 1979 to 1 November 1980 on which pension contributions are based) we have these categories:

```
     0 -    999 NoK
  1000 -  24999
 25000 -  49999
 50000 -  74999
 75000 -  99999
100000 - 124999
125000 - 149999
150000 - 174999
175000 or more
```

For the woman's income variable the last five categories are merged together.

3. METHOD

The objective of this report is to cast light on the association between fertility and certain sociodemographic variables. As explained in chapter 2 we have selected three cohorts, 1935, 1945 and 1955, and have focused on the number of children by age 39, when most women have terminated their childbearing period, and age 29. In addition to this variable, which will often be referred to simply as fertility, we have paid some attention to the prevalence of child-lessness.

Our data file does not give us a very good opportunity to analyse the interplay between fertility behaviour and the socioeconomic situation. Except for the birth and marriage histories we have no continuous measurement of the variables. We have been able to consider only one or at most two observations of the sociodemographic variables in our descriptions. For instance, the occupation at age 35 is included in our models of total number of children at age 39. The educational level at age 35 is usually chosen as one of the explanatory variables, but we have also discussed the effect on fertility at age 39 of the educational level both at age 25 and 35.

Marital status, age at marriage, educational level and place of residence are chosen as our main variables. These variables are generally known to be important sociodemographic determinants of fertility, and we assess their correlation with cohort fertility in contemporary Norway.

In some models we have also included occupation, income and other socioeconomic characteristics. There are two reasons why occupation is a less essential variable in our study than education. Firstly, education has generally received much more attention as a determinant of reproductive behaviour than occupation. Secondly, the lack of complete life histories represents a more severe problem with respect to occupation (with a separate category for not employed) than with respect to education.

A family is built up step by step, and the decision to have another child is probably to a very large extent based on <u>current</u> occupational status. It may also be important whether the woman wants to to be employed full-time in the <u>near future</u> or prefers to be primarily a housewife. The sector in which she plans to be employed is also likely to have some influence. Unfortunately, we have very limited information about these circumstances. We know whether the woman is employed at a particular age (e.g., 35 years) and her occupation at that age, but her occupational status may have changed several times after the fertility decisions were taken. In particular, it may have changed <u>because</u> of the outcome of previous fertility decisions. Due to recent childbirths the woman may have become a housewife or may have taken a job in a sector where part-time employment is easily obtained, although she was employed full-time in another sector before the children were born.

A similar argument also indicates that the woman's income at a particular age may give little insight - probably even less than occupation. Therefore it is left out in most of our models. Fewer problems are probably attached to the use of husband's occupation and income, but studies of these variables are nevertheless given the same priority as the corresponding characteristics for women.

With educational level the situation is somewhat different, as the level is

at first gradually increasing, and then often constant from age 20 or 25 up to age 39. The level at age 25 or 35 may be taken as a fairly good indicator of a woman's social reference group, her income potential etc. throughout a large proportion of her adult life.

Though we have argued that complete biographies would have been preferable in studies of, say, occupational differences in fertility level, we would like to point out that the question of causality would nevertheless be basically unsolved. The fact that one event comes after the other does not necessarily imply that the first is the cause and the second is the effect. For instance, we do not know whether women in a particular occupation at time t have more children between time t and t + δt on account of the influence of that occupation, or whether they choose that occupation because it is easier to combine with a family that is planned to be large.

A major part of our study is based on simple frequency distributions or mean values involving only a couple of background factors.

In addition we have estimated a few multivariate regression models, in which several sociodemographic characteristics are included to "explain" the individual variations in the number of children. We believe that multivariate techniqes are very important, as the variables considered in the analysis may be strongly correlated. For instance, we have found that both age at marriage and educational level seem to have a large effect on cumulated fertility in univariate models. When both variables are included simultaneously, however, it appears that the effect of education is to a large extent working through age at marriage. When the latter is fixed, there is very little variation in fertility by educational level.

Multivariate and univariate (one covariate and a constant term) models are shown in the same tables. For some variables we believe that both sets of estimates may have some interest, but unless explicitely stated we refer to the multivariate models. The effect on fertility of one variable when other variables are included in the model is occasionally referred to as the net effect of that variable.

In the regression models the educational level for the woman is treated as a continuous variable, though this variable is grouped into 6 levels from 2 to 7. This is an acceptable procedure, however, as the levels reflect number of years at school, and the number is increased by 1 or 2 years when we move from one level to the next. Furthermore, it is assumed that the effect of education is linear. This means that an increase from, say, level 4 to 5 (from 11-12 years school attendance to 13-14 years) has the same impact on fertility as an increase from 5 to 6 (from 15-16 years to 17-18 years). Quadratic or higher order terms are also disregarded for our two other continuous variables, age at marriage and number of years married.

All other variables are categorical. One of the categories is arbitrarily chosen as a baseline group. For instance, the fertility for the different regions is related to the fertility in the rural areas of Østlandet. -0.41 as an estimate for the non-rural areas of Østlandet (table 4.4) means that women in this region have 0.41 fewer children than women in the rural areas of Østlandet. A category with medium fertility or comprising a very large proportion of the population is usually chosen as the baseline group.

Interactions have not been considered. For simplicity it is assumed that the

effect of one variable is independent of the value of the other variables. For instance, the effect of education is assumed to be the same in all regions and for all ages at marriage.

The REG procedure in the SAS-system is used to fit least-squares estimates. t-values are also estimated. For the categorical variables the t-values indicate whether the fertility in one category deviates significantly from that of the baseline group. t-values higher than 2 correspond to a significance level lower than 0.05. For continuous variables, the t-values can be used similarly to test the hypothesis that the linear effect is 0.

In addition we give how much of the total individual variation is explained by the included variables, as measured by the so-called R^2-values.

Another point we draw attention to is that the effect of "timing of first birth", which turns out to be quite large, is estimated only for populations where the childless are excluded. When we refer to multivariate models in subsequent chapters, we usually mean the models where the childless are included. If estimates from other models are referred to, this is explicitely stated.

4. NUMBER OF CHILDREN AT AGE 39 AMONG WOMEN BORN 1935

It is known from other studies that women born 1935 have had more than 2.5 children on average (Brunborg and Kravdal, 1986; Brunborg, 1988). This is the highest figure recorded for any birth cohort in this century. Compared to older cohorts, women born during the depression and reaching adolescence in the early fifties married rather early and very few remained unmarried. From published population statistics it is known that only about 5 per cent never married.

In this chapter we explore some aspects of the fertility pattern of the 1935 cohort. Several tables are presented and briefly commented on. The discussion of the findings in the light of existing theory and empirical knowledge is left to chapter 9, however.

We have focused on the number of children at the end of 1974, which is very close to the completed fertility. Brunborg (1988) has estimated that women in the 1935 cohort had on average 0.03 children in their forties (based on a summation of age-specific fertility rates for the entire cohort).

The background factors that we include in the analysis in this chapter refer to the situation in 1970.

4.1 Relation between marital status, age at marriage and fertility

4.1.1 Marital status and fertility

Our population comprises 17241 women, who on average had 2.54 children by the end of 1974. Of these 17241 women 5.4 per cent had not married at that time, and these spinsters had 0.17 children each (see table 4.1). The remaining 94.6 per cent of the cohort are divided into two groups. The largest group consists of women in their first marriage who have not experienced a break-up, whereas the other group includes remarried women, widows, divorcees, currently separated and women who have been separated for a period but are now living with their husband again. The former group is 86.0 per cent of the cohort, and the latter 8.6 per cent. This implies that 9.1 per cent of those who have married, have experienced a permanent or temporary dissolution of their first marital union.

Table 4.1   Fertility at age 39 by marital status at age 39.
            1935 cohort.

	Number of women	Per cent	Average number of children	Proportion childless (per cent)
Total population	17241	100.0	2.54	9.1
never married	936	5.4	0.17	86.5
still in first marriage	14820	86.0	2.71	4.2
experienced dissolution	1485	8.6	2.60	9.0

The average number of children for the women who still live in their first marriage is 2.71, and the average for those who have lived as (formally) singles for some period after their first marriage, is 2.60.

Table 4.2 Average number of children at age 39 by age at marriage[1]).
1935 cohort

	Number of women	Average number of children	Proportion who have ex-perienced a dissolution (per cent)	Average number of children among those	
				living in first marriage	who have ex-perienced a dissolution
Total population	17241	2.54			
Never married	936	0.17			
Previously or currently married	16305	2.70	9.1	2.71	2.60
Age at marriage:					
15	2	-	-	-	-
16	26	3.19	3.8	3.20	-
17	212	3.33	6.6	3.31	3.57
18	658	3.31	5.3	3.32	3.03
19	1312	3.17	4.3	3.17	3.33
20	1789	3.04	5.0	3.05	2.92
21	2102	2.84	4.3	2.84	2.85
22	2067	2.75	3.1	2.76	2.29
23	1800	2.69	3.3	2.70	2.50
24	1378	2.58	3.3	2.59	2.45
25	1084	2.48	2.3	2.47	2.56
26	770	2.44	3.4	2.44	2.35
27	575	2.38	3.7	2.40	1.86
28	425	2.27	3.3	2.27	2.29
29	345	2.17	4.3	2.18	1.93
30	200	1.99	7.5	2.03	1.53
31	158	1.87	8.9	1.88	1.79
32	120	1.80	4.2	1.85	-
33	91	1.66	5.5	1.66	-
34	68	1.54	0.0	1.54	-
35	59	1.19	6.8	1.22	-
36	52	1.08	1.9	1.06	-
37	35	0.66	0.0	0.66	-
38	26	0.38	0.0	0.38	-
39	25	0.80	0.0	0.80	-
unknown	926	2.28	95.5	2.00	2.30

[1]) averages are not calculated for groups smaller than 10

4.1.2 Fertility by age at marriage

Table 4.2 shows that there is a very close association between average number of children at age 39 and age at marriage. The women who married in their

teens have got more than 3 children, while those who were 25 when the marriage was contracted have got only 2.5, and those who were 30 have got 2.0.

As explained in chapter 2, we do not know the year of marriage for all the women - primarily because they may have married before 1965 and divorced or separated before 1970. This group is, of course, larger for the 1935 cohort than for the other cohorts we study. As much as 5.7 per cent of the women who have married have an unknown age at marriage, and 95.5 per cent of these 926 women have experienced a marital dissolution. Consequently, the proportions given in table 4.2 for those who married before they were 30 years old, are very poor estimates of the instability. For instance, much more than 5.0 per cent of the women who married when they were 20 years old have divorced or separated. (5.0 per cent should rather be taken as an estimate of the proportion of break-ups among those who married at the age of 20 and lived in intact marriages till they were 35 (i.e. 1970).)

Table 4.2 shows that at a given age at marriage, the fertility among women who have experienced a dissolution, is lower than the fertility among women in first marriage. This difference is an underestimation of the effect of marital dissolution. In all calculations in chapter 4 involving previously married women and including age at marriage as a variable, those who married before age 30 and divorced before age 35 are excluded. This is a group with a relatively low fertility (2.30, as opposed to 2.60 for the entire group of women with a marital break-up). The estimates of fertility or fertility differentials among currently married, however, are not influenced by the exclusion of some divorcees.

4.1.3 Net effect of marital instability and age at marriage

The net effects of marital instability and age at marriage estimated in multivariate models including educational level and place of residence do not differ much from the corresponding effects according to univariate models (see table 4.3). The net effect of dissolution is about 0.08 children, and the net effect of age at marriage is 0.11 children per year. Thus, marital instability has a small impact compared to some other variables. Place of residence, for instance, has a considerably larger effect on the number of children.

When the childless were left out and the timing of first birth was included in the model, the effects of marital status and age at marriage changed very little.

4.1.4 The influence of number of years married

Another aspect of the impact of marital status on fertility that is worth considering, is that there appears to be a positiv relation between number of years in marriage and number of children at age 39. If age at first marriage is kept fixed and we focus on the women who have experienced a break-up, those who have lived as not married for several years, have fewer children than those who have had only a short period as single or in a non-marital union. In table 4.4 it appears that the net effect is about 0.02 children per year in marriage. However, this is not significantly different from 0 on a 0.05 significance level.

Table 4.3. Regression models for number of children at age 39 among women who are or have been married. 1935 cohort.

	Number of women incl. 655 child-less at age 39	Univariate models incl. 655 childless at age 39 effect estimate	Multivariate models			
			incl. 655 childless at age 39 effect estimate	t-value	excl. 655 childless at age 39 effect estimate	t-value
Educational level [1]						
(linear)		-0.098	0.063	(5.7)	0.072	
Place of residence [1]						
Østlandet non-rural	5374	-0.37	-0.33	(-10.2)	-0.31	
*Østlandet rural	1885	0.00	0.00		0.00	
Sørlandet non-rural	1378	0.16	0.15	(3.5)	0.15	
Sørlandet rural	536	0.50	0.50	(8.4)	0.53	
Vestlandet non-rural ...	1657	0.08	0.13	(3.2)	0.12	
Vestlandet rural	1039	0.60	0.65	(13.9)	0.66	
Trøndelag non-rural	801	-0.08	-0.06	(- 1.2)	-0.08	
Trøndelag rural	553	0.48	0.50	(8.4)	0.43	
Nord-Norge non-rural ...	1063	0.18	0.18	(3.8)	0.12	
Nord-Norge rural	712	0.59	0.61	(11.3)	0.51	
Age at marriage (linear) .		-0.107	-0.108	(-38.4)	-0.091	
Marital status [2]						
*first marriage(no break)		0.00	0.00		0.00	
experienced dissolution		-0.11	-0.08	(- 1.5)	-0.09	
Timing of first birth						
1+ year before marriage	869				0.73	(17.5)
same year as marriage ..	3829				0.27	(12.3)
*1+ year after marriage .	10005				0.00	
R² statistics for the model			0.15		0.15	

[1] when the women were 35 years old
[2] when the women were 39 years old

* Baseline group

4.2 Relation between number of children and the timing of first birth relative to marriage

The estimates in table 4.3 indicate that early childbearing is associated with high fertility. For instance, the small group of women who have had a premarital birth, have 0.73 children more (net effect) than those who have had their first child the year after marriage or later. Having a child very early in marriage or just before also has a positive effect on fertility, but less pronounced.

Table 4.4. Regression models for number of children at age 39 among women who have experienced a marital break-up. 1935 cohort.

	Number of women incl. 38 child-less at age 39	Univariate models incl. 38 childless at age 39 effect estimate	Multivariate models incl. 38 childless at age 39		excl. 38 childless at age 39	
			effect estimate	t-value	effect estimate	t-value
Educational level [1]						
(linear)		-0.209	-0.055	(- 0.9)	-0.036	
Place of residence [1]						
Østlandet non-rural	277	-0.57	-0.41	(- 2.1)	-0.47	
*Østlandet rural	52	0.00	0.00		0.00	
Sørlandet non-rural	45	-0.32	-0.24	(- 0.9)	-0.40	
Sørlandet rural	13	0.48	0.49	(1.3)	0.24	
Vestlandet non-rural ...	69	-0.10	-0.04	(- 0.2)	-0.18	
Vestlandet rural	22	0.58	0.57	(1.8)	0.44	
Trøndelag non-rural	33	0.08	0.11	(0.5)	-0.02	
Trøndelag rural	15	-0.29	-0.35	(- 1.0)	-0.28	
Nord-Norge non-rural ...	45	0.26	0.34	(1.3)	0.11	
Nord-Norge rural	28	0.53	0.61	(2.0)	0.36	
Age at marriage (linear) .		-0.124	-0.092	(- 2.1)	-0.091	
Number of years married [2]						
(linear)		0.112	0.021	(0.5)	0.016	
Timing of first birth						
1+ year before marriage	73				0.61	(3.8)
same year as marriage ..	179				0.04	(0.3)
*1+ year after marriage .	309				0.00	
R² statistics for the model			0.18		0.18	

[1] when the women were 35 years old
[2] when the women were 39 years old

* Baseline group

4.3   Relation between educational level and fertility

4.3.1 Educational level for women born 1935

In the 1970 census, when the women were 35 years old, 70.8 per cent had the lowest educational level (2), and only 1.5 per cent had the highest levels (6 and 7). Other figures are given in table 4.5.

Table 4.5 Relation between fertility at age 39, marital status at age 39 and educational level at age 35. 1935 cohort

Educatio-nal level	Numbers	Per cent	Marital status	Per cent	Propor-tion childless (per cent)	Average number of child-ren
2 (7-9 years school attendance)	12211	70.8	never married stable unions break-up	100.0 4.5 86.6 8.9	8.0 81.7 4.2 7.7	2.63 0.24 2.77 2.71
3 (10 years school attendance)	2577	14.9	never married stable unions break-up	100.0 4.5 87.2 8.4	8.3 88.7 3.9 11.1	2.46 0.13 2.61 2.48
4 (11-12 years school attendance)	1205	7.0	never married stable unions break-up	100.0 7.2 84.1 8.7	11.9 94.3 4.3 16.2	2.32 0.06 2.52 2.08
5 (13-14 years school attendance)	933	5.4	never married stable unions break-up	100.0 10.7 83.2 6.1	14.5 94.0 4.5 10.5	2.27 0.06 2.56 2.13
6 (15-16 years school attendance)	150	0.9	never married stable unions break-up	100.0 17.3 76.0 6.7	26.0 96.2 11.4 10.0	1.80 0.04 2.18 2.75
7 (17-18 years school attendance)	95	0.6	never married stable unions break-up	100.0 12.6 82.1 5.3	13.7 100.0 1.3 0.0	2.21 0.00 2.56 1.50
Other levels, missing	70	0.4				
Total	17241	100.0				

4.3.2 Family formation and dissolution by educational level

It is evident from table 4.5 that there is a strong link between family formation and education. Among women with level 6 or 7 about 15 per cent have never married. The corresponding proportion is about 9 per cent at level 4 and 5 and 4.5 per cent at level 2 and 3.

There is also a difference - though much smaller - in the dissolution propensity. About 9 per cent of the women at level 2-4 who marry, experience a dissolution of the marriage, whereas the corresponding proportion for the other

women is about 7 per cent. A large part of this difference is probably due to a higher age at marriage, which is associated with lower duration-specific divorce intensities and which, with our observation plan, also has the effect that the period of exposure is shorter.(The net influence of education on divorce is one of the main subjects in a study that is currently being carried out by Kravdal and Noack (1989)).

The age at marriage, age at first birth and timing of first birth relative to marriage is shown in table 4.6 for different educational levels. It is evident that age at first birth as well as age at marriage is higher for women who have achieved a high level of education. The difference between the proportion who have married and the proportion who have had a child when they are 25 years old is lowest for the women with few years school attendance. This is also reflected in the three columns to the right in the table. The proportion who got their first child the year after marriage or later increases from 64 per cent to 89 per cent across educational levels.

Table 4.6 Some family formation parameters, by educational level. 1935 cohort

Educational level at age 35	Never married at age 39 [1]	Married			Childless at age 39 [1]	First child at age		First child born		
		age unknown [1]	age 16-20 [1]	age 16-25 [1]		16-20 [1]	16-25 [1]	year before marriage or earlier [2]	same year [2]	year after marriage or later [2]
2[3]	4.5	5.6	28.4	75.4	8.0	23.1	71.6	7.0	29.5	63.5
3	4.5	5.2	17.1	73.2	8.3	11.9	61.5	4.1	21.1	74.8
4	7.2	5.9	4.9	59.8	11.9	3.5	45.5	2.5	16.4	81.1
5	10.7	2.8	2.0	52.3	14.5	0.6	32.8	1.7	10.0	88.3
6	17.3	4.0	1.3	38.0	26.0	0.7	19.4	1.9	9.6	88.6
7	12.6	3.2	1.1	55.8	13.7	1.1	29.5	2.5	8.9	88.6

[1] per cent of all women
[2] per cent of those of the women who have married before age 39 (and for whom we know the age at marriage) and who have at least one child at that age
[3] see explanation in table 4.5

4.3.3 Average number of children by educational level

We now return to table 4.5 for a closer inspection. Our results show that there is a fairly large fertility gradient from low to high education. At level 2 the average number of children is 2.63, and at level 6 it is 1.80. The weighted average including both level 6 and 7 is 1.96, which is 0.67 lower than the fertility at level 2.

A part of this difference is due to a larger proportion of never married among the highly educated women, and a lower fertility among the never married.

Whereas the 4.5 per cent never married at level 2 had 0.24 children, the 17.3 per cent never married at level 6 had 0.04 children. The proportion childless was 81.7 and 96.2, respectively.

This implies that the difference in fertility between educational levels when we consider stable couples exclusivley is smaller than 0.67. Actually, the figure is 0.33 (2.34 as an average for level 6 and 7 and 2.77 for level 2). There seems to be a small increase in the proportion of women in stable unions who are childless. The figures fluctuate considerably from one educational level to the other, but if we take the average for level 6 and 7, we get 7.2 per cent. This is higher than the other proportions, which range from 3.9 to 4.5 per cent.

Women who have had a broken union have consistently lower fertility than those in stable marriages. There is only one exception (the 10 women in broken union at level 6).

4.3.4 Net effect of education on fertility

The effect of education for women who have married and for whom we know the year of marriage, is shown in figure 4.1. The estimates according to univariate models are plotted as dotted lines. It appears that the number of children goes down with increasing length of school attendance, with the exception of an increase from level 4 to 5 and from 6 to 7. If we substitute with a linear effect, there will be a reduction of 0.098 children per educational level.

When other factors are included, however, the effect of education changes sign and is significantly positive (see also table 4.3). This is no artifact due to the exclusion of 926 women with an unknown age at marriage. There is a significant positive net effect of education also in models where only the currently married are included. The difference between estimates in uni- and multivariate models is mainly due to a higher age at marriage for the women with high education. Stated differently, when we compare women marrying at the same age, those who have the highest education at age 35 have the highest number of children at age 39.

When both age at marriage and educational level are included in the regression models, the linear effect of education is 0.006 per level (not shown in tables). In figure 4.2 we have illustrated this in a very simple way by plotting the average number of children for two different educational levels (2 and 3+4) and several ages at marriage. The total fertility difference 0.19 (2.77 for level 2 and 2.58 for level 3+4) obtained when all ages are merged together is large compared to the differences at each age. For several ages the fertility at level 3+4 is higher than at level 2.

Among the other variables that are included, place of residence apparently accounts for most of the change in the estimated effect of educational level. When we focus on the stable couples exclusively, the effect of education is -0.094 in a univariate model (see table 4.7), which is close to the parameter estimated when the broken unions are also included. If we include age at marriage, place of residence and first birth timing the estimate is changed to 0.07 (not shown in tables), and if we extend the model with even more variables, there is an increase to 0.09, which is mainly due to a correlation between woman's occupation and education.

Figure 4.1 Relative[1] effect of education on the number of children at age 39. 1935 cohort
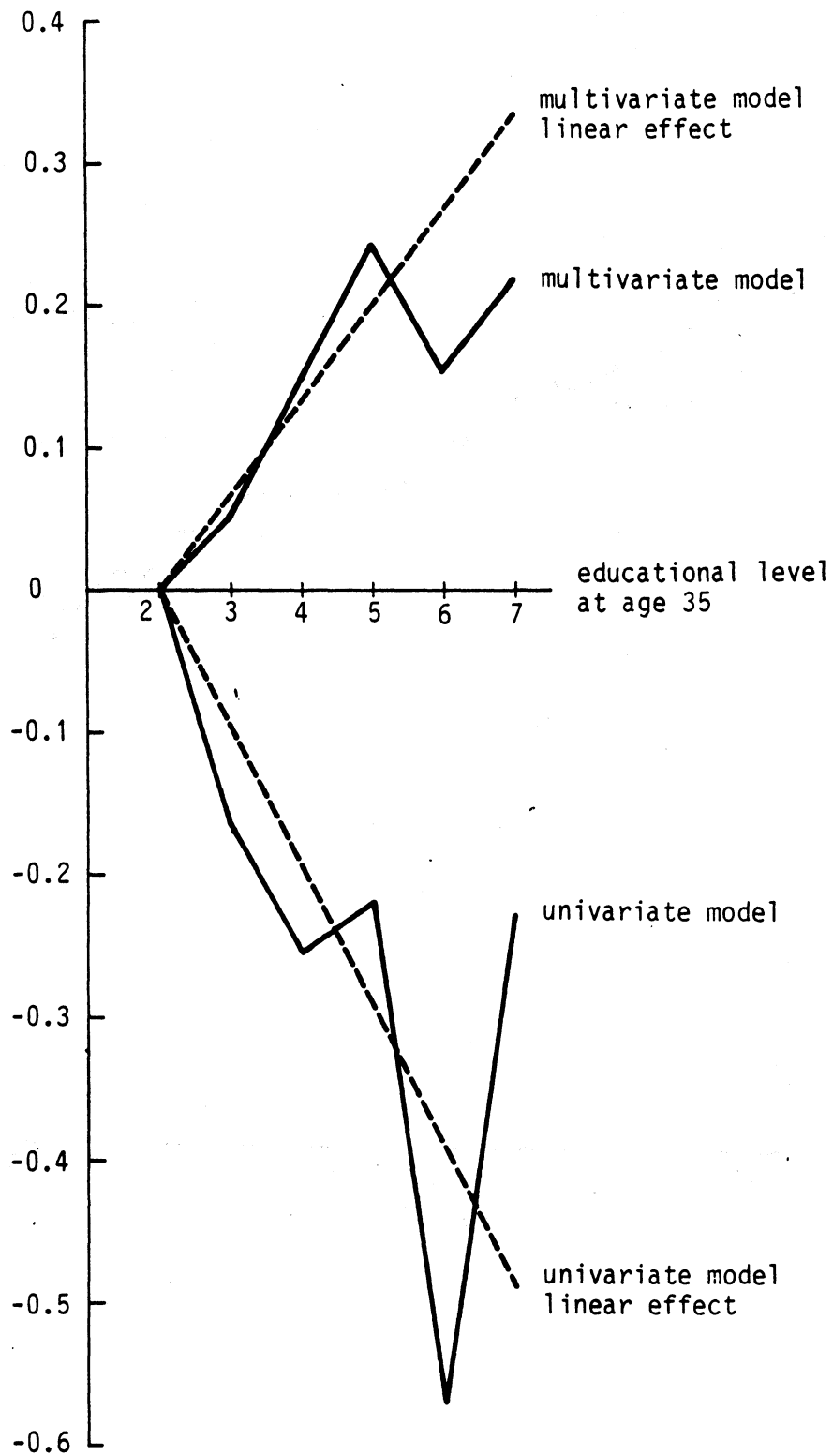
1) the effect is fixed to 0 at level 2

Figure 4.2 Average number of children at age 39 by age at marriage and
educational level at age 35. 1935 cohort
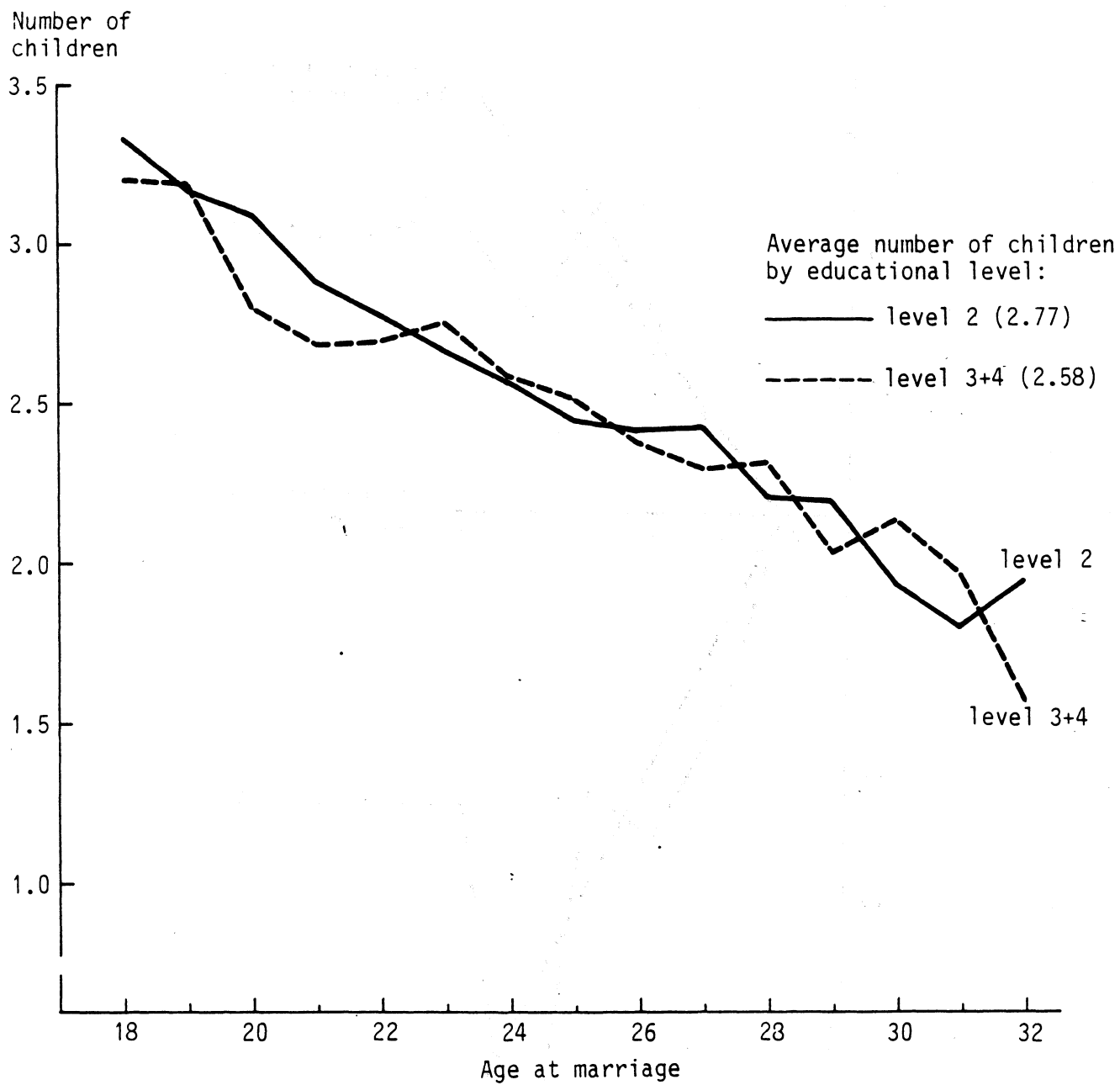
Number of
children

Table 4.7. Regression models for number of children at age 39 among women living in stable unions. 1935 cohort.

	Number of women incl. 617 childless at age 39	Univariate models incl. 617 childless at age 39 effect estimate	Multivariate models incl. 617 childless at age 39 effect estimate	t-value	excl. 617 childless at age 39 effect estimate	t-value
Educational level [1]						
(linear)		-0.094	0.092	(6.3)	0.091	
Place of residence [1]						
Østlandet non-rural	5457	-0.36	-0.20	(- 5.9)	-0.19	
*Østlandet rural	1833	0.00	0.00		0.00	
Sørlandet non-rural	1333	0.17	0.23	(5.2)	0.24	
Sørlandet rural	523	0.50	0.44	(7.6)	0.49	
Vestlandet non-rural ...	1588	0.09	0.24	(5.8)	0.24	
Vestlandet rural	1017	0.61	0.65	(14.0)	0.66	
Trøndelag non-rural	768	-0.09	0.06	(1.1)	0.03	
Trøndelag rural	538	0.50	0.46	(7.9)	0.39	
Nord-Norge non-rural ...	1018	0.18	0.29	(6.1)	0.23	
Nord-Norge rural	684	0.59	0.57	(10.7)	0.49	
Age at marriage (linear) .		-0.107	-0.100	(-27.0)	-0.093	
Timing of first birth						
1+ year before marriage	796				0.77	(18.2)
same year as marriage ..	3650				0.31	(14.0)
*1+ year after marriage .	9696				0.00	
Occupation [1]						
not employed	9175	0:.75	0.76	(14.2)	0.63	
technical, scientific,						
juridical work	86	-0.15	-0.04	(- 0.3)	0.01	
artistic, literary work	25	0.24	0.42	(1.7)	0.35	
medical work	500	0.15	0.38	(4.9)	0.34	
pedagogical work	460	0.25	0.29	(3.4)	0.27	
administration	31	-0.13	0.22	(1.0)	0.43	
clerical work	969	-0.22	0.01	(0.2)	0.06	
sales work, commerce....	819	-0.01	0.02	(0.3)	0.02	
agriculture, fishing ...	923	1.01	0.68	(9.5)	0.60	
graphic work	21	-0.21	0.11	(0.4)	-0.07	
*industry, craft (excl.						
graphic work)	523	0.00	0.00		0.00	
hotel, restaurant	383	0.12	0.24	(3.0)	0.21	
house porter, charwork .	562	0.53	0.50	(6.9)	0.35	
other occupations	282	0.09	0.16	(1.9)	0.10	

Table 4.7 cont.

	Number of women incl. 617 child-less at age 39	Univariate model incl. 617 childless at age 39 effect estimate	Multivariate models			
			incl. 617 childless at age 39		excl. 617 childless at age 39	
			effect estimate	t-value	effect estimate	t-value
Husband's education [1]						
unknown [3]	173	-1.64	-0.14	(- 0.9)	-0.14	
low (2)	8026	0.20	0.02	(0.9)	0.02	
* medium (3-5)	5509	0.00	0.00		0.00	
high (6-7)	1051	0.07	0.06	(1.3)	0.08	
Husband's occupation [1]						
not employed, unknown [3]	291	-1.04	0.04	(0.4)	0.12	
technical, scientific, juridical work	1134	-0.22	-0.01	(- 0.2)	0.01	
artistic, literary work	87	-0.27	0.06	(0.5)	0.06	
medical work	157	0.25	0.29	(2.8)	0.31	
pedagogical work	612	0.01	0.05	(0.8)	0.07	
religious work	26	0.34	0.24	(1.0)	0.27	
administration	865	-0.10	0.01	(0.3)	0.02	
clerical work	727	-0.31	-0.14	(- 2.9)	-0.10	
sales work, commerce ...	1127	-0.22	-0.07	(- 1.9)	-0.05	
agriculture, fishing ...	1422	0.41	0.17	(3.9)	0.20	
transport	1648	0.02	0.02	(0.6)	0.01	
wood work	1075	0.11	0.02	(0.4)	0.04	
graphic work	135	-0.34	±0.13	(- 1.3)	-0.10	
*industry, craft (excl. wood, graphic work) ...	4604	0.00	0.00		0.00	
hotel, restaurant	105	-0.20	-0.09	(- 0.7)	-0.07	
house porter, charwork .	132	-0.09	-0.04	(- 0.4)	-0.04	
. other occupations	612	-0.06	-0.04	(- 0.7)	-0.04	
Couple's religion [1] both members of.						
* Norwegian Church	13443	0.00	0.00		0.00	
other rel. society ...	301	0.60	0.65	(9.4)	0.66	
none member of rel. soc.	49	0.33	0.44	(2.6)	0.42	
restgroup [3]	966	-0.45	0.01	(0.2)	0.02	
Parents' education [4] unknown, not living with parents at age 25	12759	0.72	0.11	(3.1)	0.03	
*low education (2)	1731	0.00	0.00		0.00	
medium education (3-5) .	182	0.00	-0.04	(- 0.4)	0.05	
high education (6-7) ...	87	0.11	0.16	(1.2)	0.15	
R^2 statistics for the model			0.21		0.19	

[1] when the women were 35 years old
[3] including women who had not yet married at age 35
[4] when the women were 25 years old

* Baseline group

4.4   Regional fertility differentials

4.4.1 Family formation and dissolution by region

Regional differentials in marriage propensity are very small (see table 4.8). In the southern part of Norway the proportion never married is about 0.5 per cent higher in non-rural than in rural districts, while there is an opposite trend in Trøndelag and Nord-Norge. In general, the proportions are slightly higher than average in Vestlandet (6.5 and 6.1 per cent) and slightly lower in Østlandet (5.3 and 4.7 per cent).

The proportion of marriages that break, however, differ widely from region to region. This means that the association between region and family behaviour is quite different from the association involving education. The effect of education on marriage propensity was considerably higher than the effect on marriage dissolution.

In the densely populated areas of Østlandet more than 11 per cent of the marriages have been dissolved (10.6/94.7=0.112). The corresponding figures in Sørlandet are 6.7 per cent (rural) and 5.4 per cent (non-rural). A lower dissolution risk in the rural than in the non-rural districts is observed in all parts of the country.

These differences in dissolution pattern cannot be explained by age at marriage. For instance, the women living in Sørlandet have married earlier than those in Østlandet (see table 4.9).

Table 4.9 clearly indicates that there are some differences in age at first marriage and first birth across regions. The proportion who are known to have married before age 25 is about 76 per cent in Sørlandet and 70-73 per cent in the remaining part of the country. These differences between Sørlandet and other parts of Norway may be overestimated, as several of those with an unknown age at marriage (who are a smaller group in Sørlandet than elsewhere) have married before they were 25 years old.

For first births the pattern is different. The proportion who have a child before they are 25 years old is highest in Nord-Norge (75 per cent) and lowest in the non-rural part of Østlandet (60 prosent). Sørlandet and Vestlandet have a position not much higher than Østlandet. Nevertheless, these regions eventually catch up with Nord-Norge with respect to fertility. The number of children at age 39 is almost equal in Sørlandet, Vestlandet and Nord-Norge (see table 4.8).

Since women in Sørlandet marry early and get their first child fairly late it is reasonable to expect that few of these women have a child when they marry. This is confirmed by table 4.9. The proportion who had their first child the year after their marriage or later, was about 77 per cent, as opposed to 55 per cent in Nord-Norge.

4.4.2 Average number of children by place of residence

In table 4.8 we observe large regional variations in fertility. Women in the non-rural areas of Østlandet have only 2.20 children, which is almost 1 child less than the figure for the rural areas of Nord-Norge. The fertility for the

Table 4.8 Relation between fertility at age 39, marital status at age 39 and place of residence at age 35. 1935 cohort

Place of residence		Numbers	Per cent	Marital status	Per cent	Proportion childless (per cent)	Average number of child-ren
Øst-landet	non-rural	6519	37.8		100.0	10.7	2.20
				never married	5.3	92.2	0.09
				stable unions	84.1	5.5	2.35
				break-up	10.6	11.7	2.06
Øst-landet	rural	2098	12.2		100.0	8.3	2.59
				never married	4.7	86.7	0.23
				stable unions	87.8	4.1	2.70
				break-up	7.5	8.2	2.67
Sør-landet	non-rural	1521	8.8		100.0	8.1	2.69
				never married	5.8	92.1	0.09
				stable unions	88.0	2.7	2.88
				break-up	6.3	6.3	2.53
Sør-landet	rural	586	3.3		100.0	7.2	3.03
				never married	5.3	83.9	0.16
				stable unions	89.6	3.1	3.21
				break-up	5.1	0.0	3.00
Vest-landet	non-rural	1880	10.9		100.0	9.5	2.59
				never married	6.5	91.8	0.08
				stable unions	84.8	3.5	2.79
				break-up	8.7	6.8	2.54
Vest-landet	rural	1140	6.6		100.0	8.8	3.10
				never married	6.1	88.6	0.11
				stable unions	89.2	3.4	3.31
				break-up	4.7	5.7	3.06
Trøn-delag	non-rural	902	5.2		100.0	8.3	2.48
				never married	5.3	77.1	0.25
				stable unions	85.6	4.3	2.61
				break-up	9.1	6.1	2.60
Trøn-delag	rural	615	3.6		100.0	7.0	3.02
				never married	5.5	67.7	0.53
				stable unions	87.6	2.6	3.20
				break-up	6.8	14.3	2.69
Nord-Norge	non-rural	1186	6.9		100.0	7.0	2.76
				never married	4.5	71.7	0.36
				stable unions	86.4	3.9	2.88
				break-up	9.1	4.6	2.81
Nord-Norge	rural	794	4.6		100.0	6.6	3.14
				never married	5.8	58.7	0.57
				stable unions	86.3	3.2	3.30
				break-up	7.9	4.8	3.37
Total		17241	100.0				

Table 4.9 Some family formation parameters, by place of residence. 1935 cohort

Place of re-cidence at age 35		Never married at age 39 [1]	Married			Child-less at age 39 [1]	First child at age		First child born year before marri-age or earlier [2]	same year [2]	year after marri-age or later [2]
			Age un-known [1]	age 16-20 [1]	age 16-25 [1]		16-20 [1]	16-25 [1]			
Øst-landet	n-r	5.3	6.6	20.8	70.0	10.7	16.4	60.3	4.6	23.9	71.5
	r	4.7	5.3	26.2	73.8	8.3	21.5	68.8	4.7	31.1	64.1
Sør-landet	n-r	5.8	3.4	24.7	76.9	8.1	17.2	66.3	3.1	21.1	75.8
	r	5.3	3.4	27.8	76.3	7.2	16.0	66.3	2.9	19.0	78.2
Vest-landet	n-r	6.5	5.3	19.3	70.7	9.5	14.2	64.2	4.0	26.6	69.5
	r	6.1	2.7	22.3	72.0	8.8	17.6	67.6	5.6	27.3	67.0
Trøn-delag	n-r	5.3	5.7	23.3	71.8	8.3	20.7	64.2	4.9	31.7	63.4
	r	5.5	4.4	26.7	73.0	7.0	26.0	72.0	11.2	29.1	59.7
Nord-Norge	n-r	4.5	5.7	28.3	73.9	7.0	24.9	75.0	13.4	28.3	58.4
	r	5.8	4.5	28.5	73.1	6.6	24.2	75.0	18.1	28.5	53.4

[1] per cent of all women
[2] per cent of those of the women who have married before age 39 (and for whom we know the age at marriage) and who have at least one child at that age

n-r = non-rural
  r = rural

never married is varying considerably. In the non-rural areas of Vestlandet the cumulated fertility is 0.08, and 91.8 per cent are childless, whereas the corresponding figures are 0.57 and 58.7 per cent in the non-rural areas of Nord-Norge. Since the proportion never married is almost constant across regions, the difference in average fertility for stable couples is of the same magnitude as for the entire group of women. In the non-rural areas of Østlandet the stable couples have 2.35 children, as opposed to 3.30 in the rural areas of Nord-Norge and 3.31 in the non-rural areas of Vestlandet.

With respect to average number of children there are 3 distinct groups:
1) non-rural areas of Østlandet (2.35 for stable couples)
2) rural areas of Østlandet + the non-rural areas of the
   other regions (2.61-2.88)
3) Rural areas of the other regions (3.20-3.31)

Furthermore, we observe that also when we group by region, the women who have experienced a break-up have lower fertility than those in stable unions.

The proportion childless differs from region to region - for the never married as well as the married. Among the women in first marriage the percentages are highest in Østlandet: 5.5 per cent in the non-rural districts and 4.1 in the rural districts. They are lowest in Sørlandet with 2.7 and 3.1, respectively. Østlandet also has the highest figures for the total group of women (10.7 and 8.3 per cent), while Nord-Norge has the lowest figures (7.0 and 6.6 per cent).

4.4.3 Net effect of place of residence on fertility

We now want to show how the regional fertility variation is influenced by inclusion of other factors in regression models. We focus on the stable couples (see table 4.7). The estimated effects for the complete group of ever married women are almost equal.

As stated before, the difference between the rural areas of Vestlandet and the non-rural areas of Østlandet is close to 1.0 child (0.97, to be exact) in a univariate model. In multivariate regression models this difference is reduced to 0.85. There are also other changes: When the childless are left out of the population, Vestlandet has a higher fertility than Nord-Norge, mostly because of higher age at marriage (conclusion based on calculations not shown in this report) and fewer premarital births. In all multivariate models there is also a smaller difference between rural and non-rural than in the multivariate models (e.g., it is reduced from 0.59 to 0.40 in Trøndelag). In other words, fertility differentials by urbanity are to a small extent explained by other sociodemographic variables. Apparently, this cannot be ascribed to the correlation with one particular variable, however.

4.5 A general picture of fertility differentials in the 1935 cohort based on multivariate regression models

Summarizing the results presented in previous sections of chapter 4 it is obvious that age at marriage, timing of first birth relative to marriage, and place of residence are strongly correlated with the number of children. Education is also a crucial factor, but with a net effect on fertility that has a postive sign, whereas the results obtained in simple univariate calculations indicate that increased educational attainment tends to depress fertility.

Other variables that we have studied have also some effect on fertility. We now focus on the net effects displayed in table 4.7.

Compared to the women working in industry and craft, those engaged in medical and pedagogical work have a fairly large family. So have those working in hotels and restaurants or with charwork. The highest fertility is found in the agricultural sector and among women currently unemployed. In univariate models a low fertility was observed among women in clerical work or sales work, but this has been "explained" by other variables.

Husband's occupation has a smaller impact on fertility than the woman's occupation, but it is interesting to note the good correspondance in the pattern between the effects of these two characteristics - e.g. with agriculture and medical work ranked among the high fertility groups. Pedagogical work for men, however, is not associated with particularly high fertility. Neither is work in

hotels and restaurants or as a house porter. This is in contrast with what we
found for the women's occupation. Another difference is that clerks have signi-
ficantly lower fertility than those in the industrial sector. The effect on fer-
tility of religious work seems large, but it is not significantly different from
0 on a 0.05 level. Within the industry and craft sector men working with
wooden material have a slightly higher than average fertility, and those engaged
in graphic work have a lower fertility. This appears quite clearly in a uni-
variate model, but in multivariate models the differences are small and insigni-
ficant.

Husband's education has virtually no independent effect according to our
models.

The small group of couples where both spouses are in another religious
society than the Norwegian Church, or are not involved in any religious society,
have 0.4-0.6 children more than the other women. This must be considered a
fairly large effect.

The last group that we will pay attention to are the few women with highly
educated parents, who have slightly higher fertility (0.16) than those who have
parents on the lowest educational level. This difference is not significant on a
0.05 level, however. Most women born 1935 did not live with their parents in
1960, when they were 25 years old.

5. NUMBER OF CHILDREN AT AGE 39 AMONG WOMEN BORN 1945

From the 1935 to the 1945 cohort there was a reduction in completed fertility. Whereas the women born 1935 had 2.54 children when they were 39 years old (in 1974), those born 10 years later, had 2.22 at that age. In this chapter we present a discussion of the fertility differentials for the 1945 cohort that is very similar to the one we presented for the 1935 cohort. A crucial element of this discussion will be the comparision between the two cohorts. For the 1945 cohort we focus on number of children and marital status at the end of 1984 and regional and social characteristics from the 1980 census.

5.1   Relation between marital status, age at marriage and fertility.

5.1.1 Marital status and fertility

As mentioned in chapter 2, 27213 women born in 1945 are included in our population. They had on average 2.22 children at the end of 1984.

As in the 1935 cohort a small proportion have never married. Only 6.6 per cent have remained unmarried (see table 5.1). However, these women had 0.32 children, which is almost twice the corresponding 1935 figure. Of the remaining 93.4 per cent, 18.4 per cent have experienced a dissolution (19.7 per cent of the 93.4 per cent who have married). This clearly indicates that divorces and separations are much more widespread than in the 1935 cohort, where the corresponding figure was only about 9 per cent. Women born 1945 who have had a break-up, have 0.16 children less than those who have lived in stable unions - a figure which is very close to the corresponding 1935 figure.

Noting these changes in the dissolution propensity, one would perhaps be inclined to believe that family stability is the clue to understanding and explaining the fertility decline between the two cohorts. This is obviously not the case, however. If women in stable unions have 0.16 children more than those who have had a break-up, and the proportion with a break-up increases from 9 per cent to 19 per cent, the fertility of women who have ever married, decreases with 0.016 children. Consequently, the increasing instability explains only a very small part of the fertility decline from 2.54 to 2.22. Another small part is explained by an increasing proportion of never married. The negative effect on fertility of increasing this proportion from 5.4 per cent to 6.6 per cent - taking into account that the fertility in this group rises from 0.17 to 0.32 - is about 0.02. Actually, if we use the marital status specific fertility figures from the 1935 cohort and the distribution over marital status that we found for the 1945 cohort, the fertility will be 2.51, which means that the reduction from the 1935 level is only 0.03. In other words, changes in family formation and dissolution only accounts for about 10 per cent of the entire fertility decline from the 1935 to the 1945 cohort.

We also want to point out that the drop in fertility among those living in first marriage is 0.32 (2.71-2.39), precisely as it is for the overall fertility (2.54-2.22).

Table 5.1 Fertility at age 39 by marital status at age 39. 1945 cohort

	Number of women	Per cent	Average number of children	Proportion childless. Per cent
Total population	27213	100.0	2.22	9.1
never married	1808	6.6	0.32	75.6
still in first marriage	20387	74.9	2.39	3.8
experienced dissolution	5018	18.4	2.23	6.4

5.1.2 Fertility by age at marriage

The average number of children by age at marriage is shown in table 5.2. As for the 1935 cohort, there are wide differences in fertility between women who marry in their teens and those who marry, say, at age 30.

The age at marriage is unknown for 516 women (2.0 per cent of the entire group of currently or previously married women). This small group of women have 2.57 children each, which is higher than the average for stable couples. Most of them have probably married before they were 20 years old and divorced before age 25. Their low age at marriage tends to give them a higher fertility than average. This is only partly offset by an early divorce.

Because several of the young divorcees are left out, the "proportion who have experienced a dissolution" in table 5.2 is only a reliable estimate of the marital instability for women marrying after age 20. For instance, the proportions are 23.7, 14.3 and 10.6 per cent for those who were 20, 25 and 30, respectively, when they married. These figures should be compared to the (partial) divorce probabilities estimated by Kravdal and Noack (published 1988 and unofficial tables), which are 18.9, 11.6 and 7.9, respectively. The difference is mainly due to separations that are not turned into divorces - partly because the spouses have started living together again, partly because too short period of time has elapsed between separation and censoring time (the end of 1984).

Furthermore, it may be seen in table 5.2 that for each age group the women in stable unions have the highest fertility. This is the general pattern, with only a few exceptions.

When we compare table 5.2 and table 4.2, we find that the average fertility is about 0.4 lower in the 1945 cohort than in the 1935 cohort for all ages lower than 28. From age 29 to age 34 the difference is about 0.2, and for brides older than 35 it is (with one exception) smaller than 0.2.

5.1.3 Net effect of marital instability and age at marriage

Inspecting table 5.3 we find that the net effects of marital instability and age at marriage are close to the effects obtained with univariate models. The net effects are -0.22 and -0.10, respectively.

Table 5.2 Average number of children at age 39 by age at marriage[1]).
1945 cohort

| | Number of women | Average number of children | Proportion who have ex- perienced a dissolution (per cent) | Average number of children among those | |
				living in first marriage	who have ex- perienced a dissolution
Total population	27213				
Never married	1808				
Previously or currently married	25405	2.36	19.7	2.39	2.23
Age at marriage:					
15	3	-	-	-	-
16	56	3.16	32.1	3.11	3.28
17	464	3.10	27.4	3.12	3.02
18	1358	2.91	23.7	2.91	2.93
19	2463	2.74	22.9	2.78	2.61
20	3239	2.60	23.7	2.65	2.45
21	3590	2.41	20.7	2.45	2.25
22	3392	2.36	16.4	2.42	2.08
23	2877	2.23	15.2	2.30	1.87
24	2228	2.20	14.5	2.30	1.63
25	1494	2.11	14.3	2.21	1.49
26	1066	2.01	13.4	2.09	1.52
27	692	2.02	13.9	2.11	1.52
28	452	1.84	12.4	1.88	1.57
29	379	1.90	12.4	1.96	1.45
30	255	1.70	10.6	1.76	1.22
31	202	1.74	9.9	1.79	1.35
32	178	1.58	9.6	1.62	1.17
33	129	1.42	10.1	1.44	1.23
34	111	1.31	9.0	1.33	1.10
35	81	1.11	6.2	1.12	-
36	61	0.90	4.9	0.88	-
37	54	0.83	7.4	0.78	-
38	36	0.72	0.0	0.72	-
39	29	0.28	0.0	0.28	-
unknown	516	2.57	97.5	2.85	2.56

[1]) averages are not calculated for groups smaller than 10

Table 5.3 is based on a group of married women for whom the age at marriage is known. The effect of marital break-up in a univariate model is somewhat larger than the one we observed in table 5.1. This is mainly due to the rather high fertility among the women who are excluded because their age at marriage is unknown.

We would also like to draw attention to the fact that the instability appears to have a larger impact on fertility for the 1945 cohort than for the 1935 cohort, as the net effects are -0.22 and -0.08, respectively. This also may

be due to the excluded women. In the 1935 cohort the excluded women had lower fertility than other women in broken unions, as they covered a much wider range of ages at marriage than the excluded women in the 1945 cohort, who had largely married in their teens. In our opinion the 1945 figure (0.22), being based on better data, should be considered a better estimate of the impact of family dissolution.

Table 5.3. Regression models for number of children at age 39 among women who are or have been married. 1945 cohort.

	Number of women incl. 1072 childless at age 39	Univariate models incl.1072 childless at age 39 effect estimate	Multivariate models			
			incl.1072 childless at age 39		excl.1072 childless at age 39	
			effect estimate	t-value	effect estimate	t-value
Educational level [1] (linear)		-0.101	0.003	(0.6)	0.013	
Place of residence [1]						
Østlandet non-rural	9897	-0.33	-0.26	(-11.9)	-0.24	
*Østlandet rural	2601	0.00	0.00		0.00	
Sørlandet non-rural	2344	0.07	0.08	(2.7)	0.10	
Sørlandet rural	730	0.51	0.49	(11.8)	0.53	
Vestlandet non-rural ...	2787	-0.02	0.04	(1.3)	0.03	
Vestlandet rural	1445	0.41	0.41	(12.7)	0.41	
Trøndelag non-rural	1581	-0.07	-0.06	(- 1.8)	-0.09	
Trøndelag rural	746	0.25	0.24	(6.0)	0.21	
Nord-Norge non-rural ...	1805	0.03	0.05	(1.8)	0.00	
Nord-Norge rural	914	0.51	0.51	(13.5)	0.42	
Age at marriage (linear) .		-0.097	-0.097	(-51.6)	-0.081	
Marital status [2]						
first marriage(no break)	20346	0.00	0.00		0.00	
experienced dissolution	4504	-0.20	-0.22	(-13.9)	-0.18	
Timing of first birth						
1+ year before marriage	1495				0.51	(19.8)
same year as marriage ..	6322				0.16	(11.9)
*1+ year after marriage .	15961				0.00	
R² statistics for the model			0.16		0.15	

[1] when the women were 35 years old
[2] when the women were 39 years old

* Baseline group

5.1.4 The influence of number of years married

Table 5.4 shows a regression model for women who have had a marital break-up. As in the 1935 cohort, there is an increasing fertility with increasing number of years married, but the effect is larger. In the 1945 cohort the increase is 0.04 per year, as opposed to 0.02 in the 1935 cohort. This difference between the cohorts is probably also to a large extent due to the excluded women, so we will not search for further explanations.

Table 5.4. Regression models for number of children at age 39 among women who have experienced a marital break-up. 1945 cohort.

	Number of women incl. 302 child-less at age 39	Univariate models incl. 302 childless at age 39 effect estimate	Multivariate models incl. 302 childless at age 39 effect estimate	t-value	excl. 302 childless at age 39 effect estimate	t-value
Educational level [1] (linear)		-0.162	-0.056	(- 4.1)	-0.032	
Place of residence [1]						
Østlandet non-rural	2298	-0.18	-0.07	(- 1.2)	-0.07	
*Østlandet rural	318	0.00	0.00		0.00	
Sørlandet non-rural	374	0.06	0.10	(1.2)	0.12	
Sørlandet rural	62	0.49	0.47	(3.3)	0.56	
Vestlandet non-rural ...	467	0.09	0.16	(2.1)	0.14	
Vestlandet rural	126	0.29	0.24	(2.2)	0.33	
Trøndelag non-rural	293	0.26	0.28	(3.3)	0.16	
Trøndelag rural	77	0.61	0.55	(4.2)	0.46	
Nord-Norge non-rural ...	359	0.25	0.30	(3.7)	0.19	
Nord-Norge rural	130	0.73	0.69	(6.4)	0.59	
Age at marriage (linear) .		-0.144	-0.098	(-15.4)	-0.084	
Number of years married [2] (linear)		0.080	0.041	(10.5)	0.038	
Timing of first birth						
1+ year before marriage	418				0.61	(11.7)
same year as marriage ..	1339				0.14	(4.2)
*1+ year after marriage .	2445				0.00	
R² statistics for the model			0.19		0.19	

[1] when the women were 35 years old
[2] when the women were 39 years old

* Baseline group

5.2   Relation between number of children and the timing of first birth relative to marriage

As indicated in table 5.3, women who had a child prior to marriage have had a higher subsequent fertility than other women. The net effect of having a child before the year of marriage was 0.51 in the 1945 cohort, whereas the corresponding figure in the 1935 cohort was 0.73. Having a child the same year as the marriage increases fertility with 0.16 (as opposed to 0.27 in the 1935 cohort).

One might perhaps believe that the number of children is higher for women who had a premarital birth because they have been "under exposure" for a longer time if we use first birth as a starting point. Then a difference corresponding to having married a couple of years earlier might seem reasonable. The difference in fertility is higher, however, as a net effect of 0.51 corresponds to about 6 years of additional marriage exposure. This indicates that other explantions than marriage exposure time may be called for.

In table 5.5 the timing of first birth is shown for different ages at marriage. For instance, among women who marry when they are 18 years old, less than 1 per cent are childless when they are 39 years old. For those who marry when they are 10 years older, this proportion is more than 11 per cent. The proportion with a child before marriage increases with age, whereas the proportion who get a child the same year as the marriage decreases. The sum of these proportions also decreases from more than 40 per cent among teenage brides to about 25 per cent for those marrying in their mid-20s. Furthermore, it is evident from table 5.5 that, at a given age at marriage, the average number of children as well as the dissolution propensity is highest among the women who have a child before marriage. The latter association is also well established by Kravdal and Noack (1988).

5.3   Relation between education and fertility

5.3.1 Educational level for women born 1945

The educational level in 1980 for women aged 35 was much higher than it was 10 years earlier for women at the same age. The proportion with the lowest level (2) had decreased from 70 per cent to 50 per cent, and the proportion with the highest level (6+7) had increased from 1.5 per cent to 5 per cent (see table 5.6).

As fertility tends to decrease with increasing level of education, this "educational revolution" accounts for a part of the fertility decline. Using the education specific fertility figures from the 1935 cohort and the distribution by educational level from the 1945 cohort, we get a fertility of 2.48 at age 39. Thus, we might argue that 0.06 or 20 per cent of the total decline from 2.54 to 2.22 can be "explained" by the higher educational level, which again influences the marital status pattern and age at marriage.

Table 5.5 Relation between marital dissolution, average number of children and timing of first birth relative to marriage for various ages at marriage. 1945 cohort.

Age at marriage		Number	Proportion	Average no. of children[1]	Per cent who have had a marital break-up[1]
18	total	1358	100.0	2.91	23.7
	childless[2]		0.6		
	before marriage[3]		2.2	3.13	43.3
	same year[4]		40.2	3.08	23.3
	after marriage[5]		57.0	2.81	23.4
19	total	2463	100.0	2.74	22.9
	childless		0.9	0.00	
	before marriage		2.7	3.12	42.4
	same year		37.4	2.87	22.7
	after marriage		59.0	2.69	22.3
20	total	3239	100.0	2.60	23.7
	childless		1.9	0.00	43.3
	before marriage		3.7	3.16	41.2
	same year		33.3	2.71	25.1
	after marriage		61.2	2.58	21.2
21	total	3590	100.0	2.41	20.7
	childless		2.5	0.00	31.8
	before marriage		4.7	3.03	42.4
	same year		27.1	2.55	24.3
	after marriage		65.7	2.40	17.3
22	total	3392	100.0	2.36	16.4
	childless		2.7	0.00	37.4
	before marriage		4.8	2.98	29.2
	same year		22.8	2.51	19.3
	after marriage		69.8	2.37	13.7
23	total	2877	100.0	2.23	15.2
	childless		4.2	0.00	32.8
	before marriage		5.2	2.91	24.0
	same year		21.2	2.48	19.0
	after marriage		69.3	2.24	12.3
24	total	2228	100.0	2.20	14.5
	childless		4.8	0.00	44.9
	before marriage		6.2	2.68	24.8
	same year		18.9	2.38	15.4
	after marriage		70.2	2.26	11.3
25	total	1494	100.0	2.11	14.3
	childless		7.0	0.00	35.6
	before marriage		7.7	2.74	25.2
	same year		16.6	2.27	12.1
	after marriage		68.7	2.21	11.4
26	total	1066	100.0	2.01	13.4
	childless		7.8	0.00	27.7
	before marriage		9.9	2.63	18.9
	same year		17.5	2.16	17.7
	after marriage		64.7	2.12	9.7
27	total	692	100.0	2.02	13.9
	childless		7.2	0.00	36.0
	before marriage		10.0	2.48	29.0
	same year		15.2	2.30	11.4
	after marriage		67.6	2.11	9.8
28	total	452	100.0	1.84	12.4
	childless		11.7	0.00	18.9
	before marriage		15.3	2.43	31.9
	same year		11.7	1.91	17.0
	after marriage		61.3	2.04	5.4
29	total	379	100.0	1.90	12.4
	childless		11.1	0.00	23.8
	before marriage		18.5	2.43	24.3
	same year		13.2	2.04	4.0
	after marriage		8.3	2.06	8.3
30	total	255	100.0	1.70	10.6
	childless		12.9	0.00	21.2
	before marriage		17.7	2.16	15.6
	same year		12.2	1.88	9.7
	after marriage		57.3	1.91	6.9

1) not calculated for groups smaller than 10
2) childless at age 39
3) first birth before marriage (year before marriage or earlier)
4) first birth same year as marriage
5) first birth after marriage (year after marriage or later)

Table 5.6 Relation between fertility at age 39, marital status at age 39 and educational level at age 35. 1945 cohort.

Educatio-nal level	Numbers	Per cent	Marital status	Per cent	Proportion childless (per cent)	Average number of child-ren
2	13708	50.4		100.0	7.5	2.38
(7-9 years			never married	5.3	67.6	0.46
school			stable unions	75.0	3.8	2.50
attendance)			break-up	19.7	5.7	2.41
3	6756	24.8		100.0	8.0	2.15
(10 years			never married	5.7	75.5	0.29
school			stable unions	75.5	3.4	2.31
attendance)			break-up	18.7	5.8	2.12
4	2991	11.0		100.0	9.5	2.09
(11-12 years			never married	7.1	78.8	0.25
school			stable unions	76.6	3.5	2.28
attendance)			break-up	16.3	7.8	1.94
5	2318	8.5		100.0	12.1	2.02
(13-14 years			never married	9.4	83.9	0.19
school			stable unions	75.9	3.8	2.28
attendance)			break-up	14.7	9.1	1.80
6	975	3.6		100.0	15.7	1.86
(15-16 years			never married	12.6	81.3	0.21
school			stable unions	71.3	5.9	2.14
attendance)			break-up	16.1	8.3	1.96
7	344	1.3		100.0	25.0	1.64
(17-18 years			never married	18.0	90.3	0.15
school			stable unions	66.6	10.0	2.03
attendance)			break-up	15.4	15.1	1.68
Other levels, missing	110	0.4				
Total	27213	100.0			.	

5.3.2 Family formation and dissolution by educational level

As in the 1935 cohort, the tendency to remain unmarried increases with educational level. At levels 6 and 7 the proportion never married is 14 per cent, at level 4 and 5 it is 7-9, and at levels 2 and 3 it is about 5.5.

The association between education and marital dissolution is J-shaped with fairly small differences. Almost 21 per cent of the women who have no secondary education and who have married, have also experienced a break-up. This proportion goes down to 16 at level 5 and exceeds 18 for the two highest levels.

As pointed out earlier, such figures should be interpreted with caution, as age at marriage is very closely linked with education.

The **age at marriage** as well as the age at first birth increases with educational level, while the proportion who have a child when they marry decreases (see table 5.7). The figures are not very different from the 1935 figures, but it seems that age at marriage and age at first birth for a given educational level is somewhat lower for the 1945 cohort. (For the entire cohort the proportion who have married before age 25 has increased from less than 77 per cent to 80, and the proportion with a child has increased from 65 to 68.)

Table 5.7 Some family formation parameters, by educational level. 1945 cohort

								First child born[1]		
Educational level at age 35	Never married at age 39 [1])	Married			Childless at age 39 [1])	First child at age		year before marriage or earlier [2])	same year [2])	year after marriage or later [2])
		Age unknown [1])	age 16-20 [1])	age 16-25 [1])		16-20 [1])	16-25 [1])			
2[3])	5.3	2.6	37.4	81.7	7.5	31.8	77.6	8.8	32.0	59.2
3	5.7	1.5	28.1	81.1	8.0	21.0	70.9	4.7	25.6	69.7
4	7.1	0.9	12.4	73.3	9.5	7.7	57.2	3.5	20.2	76.3
5	9.4	0.7	5.6	67.5	12.1	3.1	44.2	1.5	13.4	85.2
6	12.6	0.8	6.3	58.0	15.7	4.2	36.4	1.6	12.7	85.7
7	18.0	0.9	2.6	47.1	25.0	0.3	20.7	2.1	8.0	90.0

[1]) per cent of all women
[2]) per cent of those of the women who have married before age 39 (and for whom we know the age at marriage) and who have at least one child at that age
[3]) see explanation table 5.6

5.3.3 Average number of children by educational level

The close relation between educational level and fertility is evident from table 5.6. At level 2 the average number of children is 2.38, and at level 6 and 7 it is 1.80 (weighted average). The difference is 0.58, while the corresponding difference for the 1935 cohort was 0.67.

As we also observed for the 1935 cohort, a large proportion of the overall fertility difference is due to a larger proportion of never married women at the highest education levels, and, in addition, a lower fertility among the never married (e.g. 0.46 at level 2 and 0.21 at level 6).

The fertility among women who live in stable unions decreases from 2.50 at level 2 to 2.11 at level 6+7. This difference of 0.39 is smaller than the overall difference of 0.58, and close to the difference in the 1935 cohort, where the corresponding figures were 2.77 and 2.34.

As stated in section 5.1, the fertility of stable couples is reduced by 0.32 from the 1935 to the 1945 cohort. At a given educational level, however, the reduction is 0.23-0.31 except at level 6+7, where it is 0.16. This reduction is, of course, smaller than 0.32 because the distribution over educational levels is different in the two cohorts. As we have already pointed out, the higher education in the 1945 cohort "explains" a part of the fertility decline.

It also appears in table 5.6 that women in broken unions have lower fertility than those in stable unions.

The proportion who are childless increases with educational level, from about 8 per cent to more than 15 (see table 5.7). This goes hand in hand with an increase in the proportion never married, but also if we confine ourselves to the stable unions, childlessness is apparently more widespread the higher the education. For the levels 2-5 the proportion is lower than 4 per cent, while it is 6 and 10 for the two highest levels (7 per cent as a weighted average).

Throughout this section (5.3.3) we have focused on the two highest levels 6 and 7 as one group. This is because there are only 344 women in group 7. It is interesting to note, however, that this group have only 1.64 children each, that 18 per cent are never married and that 25 per cent are childless. As much as 10 per cent of those who live in stable unions are childless.

5.3.4 The net effect of education on fertility

We found for the 1935 cohort that the negative correlation between education and fertility disappeared - or even changed sign - when other variables were included as controls. In particular, the age at marriage proved to be of great importance.

A similar result is obtained for the 1945 cohort. It is shown in table 5.3 that the effect of education according to the univariate model is -0.10 children per level, whereas the net effect is estimated to be 0.003 and not significantly different from 0. These estimates are based on a population were all married or previously married are included except those with an unknown age at marriage.

When we focus on the stable unions exclusively, the sign of the education effect is changed when the controls are included. The effect in a univariate model is -0.09. When age at marriage is included, it becomes -0.0237, and in the two models with more controls it is 0.014 and 0.022 (see table 5.8). None of these effects are significantly different from 0 on a 0.05 level.

5.3.5 Relation between number of children at age 39, educational level at age 35, and educational level at age 25.

We have also examined the association between number of children at age 39 and change of educational level from age 25 to 35. In table 5.9 it appears that the 98 women who have achieved level 7 as early as age 25, have 1.72 children at age 39. The 246 women who reach this level between age 25 and 35 have somewhat lower fertility at age 39. A similar pattern can also be observed at level 4, 5 and 6, so it seems that, at a given educational level, women who reach the actual level at a higher age than others, terminate their fertile period with fewer children.

Table 5.8. Regression models for number of children at age 39 among women
living in stable unions. 1945 cohort.

	Number of women incl. 770 child-less at age 39	Univariate models incl. 770 childless at age 39 effect estimate	Multivariate models incl. 770 childless at age 39 effect estimate	t-value	excl. 770 childless at age 39 effect estimate	t-value
Educational level [1]						
(linear)		-0.090	0.014	(1.8)	0.022	
Place of residence [1]						
Østlandet non-rural	7599	-0.33	-0.20	(- 8.5)	-0.17	
*Østlandet rural	2283	0.00	0.00		0.00	
Sørlandet non-rural	1970	0.09	0.12	(4.1)	0.14	
Sørlandet rural	668	0.50	0.43	(10.5)	0.48	
Vestlandet non-rural ...	2320	-0.03	0.10	(3.5)	0.10	
Vestlandet rural	1319	0.41	0.43	(13.2)	0.42	
Trøndelag non-rural	1288	-0.13	-0.04	(- 1.1)	-0.05	
Trøndelag rural	669	0.21	0.20	(4.8)	0.17	
Nord-Norge non-rural ...	1446	0.00	0.11	(3.3)	0.06	
Nord-Norge rural	784	0.48	0.47	(12.3)	0.39	
Age at marriage (linear) .		-0.094	-0.094	(-45.5)	-0.081	
Timing of first birth						
1+ year before marriage	1077				0.51	(17.7)
same year as marriage ..	4983				0.20	(13.5)
*1+ year after marriage .	13516				0.00	
Occupation [1]						
not employed	6529	0.29	0.41	(11.5)	0.32	
technical, scientific,						
juridical work	429	-0.31	-0.03	(- 0.5)	-0.07	
artistic, literary work	68	-0.32	0.10	(0.9)	0.21	
medical work	2012	0.00	0.17	(4.2)	0.10	
pedagogical work	1522	-0.08	0.10	(2.2)	0.05	
administration	275	-0.53	-0.23	(- 3.5)	-0.22	
clerical work	2774	-0.33	-0.15	(- 3.8)	-0.17	
sales work, commerce....	1640	-0.08	-0.04	(- 1.0)	-0.06	
agriculture, fishing ...	673	0.58	0.31	(5.8)	0.25	
graphic work	42	-0.37	-0.16	(- 1.1)	-0.13	
*industry, craft (excl.						
graphic work)	762	0.00	0.00		0.00	
hotel, restaurant	1147	0.09	0.15	(3.3)	0.09	
house porter, charwork .	1203	0.32	0.34	(7.9)	0.23	
other occupations	1270	0.10	0.11	(2.6)	0.05	

Table 5.8 cont.

	Number of women incl. 770 child-less at age 39	Univariate model	Multivariate models			
		incl. 770 childless at age 39	incl. 770 childless at age 39		excl. 770 childless at age 39	
		effect estimate	effect estimate	t-value	effect estimate	t-value
Husband's education [1])						
unknown [3])	306	-1.13	-0.21	(- 3.3)	-0.13	
low (2)	8352	0.16	-0.03	(- 1.6)	-0.01	
* medium (3-5)	9235	0.00	0.00		0.00	
high (6-7)	2453	0.00	0.12	(4.7)	0.12	
Husband's occupation [1])						
not employed, unknown [3])	849	-0.30	0.01	(0.3)	0.04	
technical, scientific, juridical work	2229	-0.15	0.02	(0.8)	0.01	
artistic, literary work	157	-0.25	0.00		0.01	
medical work	337	0.10	0.16	(2.9)	0.13	
pedagogical work	1348	-0.08	-0.02	(- 0.6)	-0.01	
religious work	63	0.41	0.40	(3.3)	0.46	
administration	1944	-0.14	0.02	(0.9)	0.02	
clerical work	774	-0.31	-0.10	(- 2.7)	-0.10	
sales work, commerce ...	1563	-0.15	-0.01	(- 0.3)	-0.02	
agriculture, fishing ...	1424	0.41	0.27	(8.3)	0.27	
transport	2074	0.00	-0.01	(- 0.6)	-0.02	
wood work	929	0.16	0.11	(3.1)	0.10	
graphic work	206	-0.26	-0.05	(- 0.7)	-0.03	
*industry, craft (excl. wood, graphic work) ...	5031	0.00	0.00		0.00	
hotel, restaurant	160	-0.14	-0.04	(- 0.6)	0.00	
house porter, charwork .	196	-0.15	-0.09	(- 1.4)	-0.02	
other occupations	1062	0.01.	0.03	(1.1)	0.03	
Couple's religion [1])						
both members of						
* Norwegian Church	17550	0.00	0.00		0.00	
other rel. society ...	420	0.58	0.58	(12.5)	0.64	
none member of rel. soc.	243	-0.19	-0.04	(- 0.7)	0.00	
restgroup [3])..........	2133	-0.21	0.00		0.01	
Parents' education [4])						
unknown, not living with parents at age 15	171	0.17	0.10	(1.4)	0.06	
*low education (2)	18116	0.00	0.00		0.00	
medium education (3-5) .	1455	-0.09	-0.02	(- 0.6)	0.00	
high education (6-7) ...	604	-0.06	0.16	(3.9)	0.16	
R^2 statistics for the model			0.21		0.20	

[1]) when the women were 35 years old
[3]) including women who had not yet married at age 35
[4]) when the women were 15 years old

* Baseline group

Table 5.9 Relation between average number of children at age 39, educational level at age 35 and educational level at age 25. 1945 cohort[1])[2])

Educational level at age 25	Educational level at age 35						
	2	3	4	5	6	7	Sum[3])
2	2.38 (13708)	2.15 (802)	1.89 (120)	2.09 (44)	1.64 (11)	(2)	2.36 (14688)
3		2.16 (5954)	1.86 (227)	1.57 (136)	1.91 (33)	(5)	2.13 (6347)
4			2.11 (2644)	1.76 (361)	1.78 (171)	1.67 (114)	2.04 (3295)
5				2.10 (1777)	1.76 (443)	1.35 (43)	2.02 (2266)
6					2.05 (316)	1.68 (82)	1.97 (402)
7						1.72 (98)	1.74 (100)
Sum[3])	2.38 (13708)	2.15 (6756)	2.09 (2991)	2.02 (2318)	1.86 (975)	1.64 (344)	(27092)

[1]) number of women in parenthesis
[2]) average number of children not calculated for groups smaller than 10
[3]) including a few missing values and levels higher than 7 (no more than 20 for the total cohort)

An interesting question is whether the low fertility among those who have taken their education later in life is due to a later start of the family-building. Apparently, this is not the case. On the contrary, in this group of women there is a larger proportion who have had their first child before they were 20 years old or 25 years old (see table 5.10). Besides, more women have married before age 20 (but fewer before age 25). We have also found that among those who have married and have children, a larger proportion have had their child during the same year as the marriage or prior to this (not shown in the table), and among the never married fertility has been higher. In brief, the women who have taken their education late have had an earlier entry into the parental role, and several have also had a less formal attachment to the father of their child. We are not able to conclude, of course, whether this is the reason why the education is taken at a later age, or whether there is an underlying factor explaining their behaviour in the initial stage of the family-building as well as their postponed education. We also want to point out that the proportion who at age 39 have had a marital break-up is considerably higher among the women who take their education later.

Table 5.10 Relation between fertility at age 39, marital status at age 39, some family formation parameters, educational level at age 35, and educational level at age 25. 1945 cohort.[1])

Educational level at age 35	25	Number of women	Marital status	Per cent	Average number of children	Proportion tion childless at age 39 (per cent)	First birth before age 20	25 (per cent)	First marriage before age 20	25	unknown (per cent)
2	2	13708		100.0	2.38	7.5	31.8	77.6	37.3	81.6	2.6
			never married	5.3	0.46						
			stable unions	75.0	2.50						
			break-up	19.7	2.41						
3	3	5946		100.0	2.16	7.6	17.8	69.6	25.6	81.4	1.2
			never married	5.2	0.27						
			stable unions	78.1	2.30						
			break-up	16.7	2.08						
3	2	802		100.0	2.15	9.9	44.3	80.3	46.9	79.8	3.9
			never married	8.7	0.39						
			stable unions	57.2	2.36						
			break-up	34.0	2.26						
4	4	2644		100.0	2.11	8.9	5.5	57.0	10.1	74.4	0.6
			never married	6.7	0.21						
			stable unions	78.7	2.31						
			break-up	14.5	1.92						
4	2-3	347		100.0	1.87	14.4	24.8	58.5	29.7	64.6	3.2
			never married	9.8	0.50						
			stable unions	60.5	2.01						
			break-up	29.7	2.05						
5	5	1777		100.0	2.10	9.2	1.5	44.7	3.5	71.8	0.2
			never married	6.4	0.18						
			stable unions	81.1	2.31						
			break-up	12.6	1.73						
5	2-4	541		100.0	1.74	21.6	8.3	42.7	12.4	53.4	2.2
			never married	19.2	0.21						
			stable unions	59.0	2.16						
			break-up	21.8	1.94						
6	6	316		100.0	2.05	12.7	1.3	28.5	2.2	59.2	0.0
			never married	9.5	0.07						
			stable unions	79.1	2.34						
			break-up	11.4	1.72						
6	2-5	658		100.0	1.77	17.3	5.6	40.3	8.2	57.4	1.2
			never married	14.1	0.26						
			stable unions	67.5	2.02						
			break-up	18.4	2.00						
7	7	98		100.0	1.72	21.4	1.0	17.4	0.0	63.3	1.0
			never married	13.3	0.00						
			stable unions	76.5	2.03						
			break-up	10.2	1.70						
7	2-6	246		100.0	1.61	26.8	0.0	22.0	3.7	40.7	0.8
			never married	19.9	0.08						
			stable unions	62.6	2.04						
			break-up	17.5	1.67						

1) women with missing value for educational level at age 25 or 35 are excluded

5.4   Regional fertility differentials

5.4.1 Family formation and dissolution by region

The differences in marriage propensity across regions are somewhat larger for the 1945 than for the 1935 cohort. Even when we leave out the smallest region (the rural areas of Trøndelag), where only 2.9 per cent have never married, the proportions range from 4.3-7.9, as opposed to 4.5-6.5 for the 1935 cohort. Among women born in 1945, the proportion never married is consistently higher in the non-rural than the rural districts. A similar trend was observed also for the 1935 cohort, but only for those living in the southern parts of the country. It appears in table 5.11 and 5.12 that Østlandet has the highest proportion who never marry, whereas Vestlandet showed the highest figures in the 1935 cohort.

As we observed for the 1935 cohort, the marital instability differs much more by place of residence than the marriage propensity does. In the non-rural areas of Østlandet 25 per cent of the women who have married, have also split up, while this proportion is only 10 per cent in the rural areas of Sørlandet and Vestlandet. The marital stability is generally lower in the more densely populated areas than in the rural districts. The non-rural districts in Sørlandet, Vestlandet, Trøndelag and Nord-Norge have a lower proportion of break-ups than the non-rural part of Østlandet, but higher than in all of the rural districts. Furthermore, we notice that the difference between rural and non-rural is smallest in Nord-Norge. This applies also for the 1935 cohort. Besides, it seems that the non-rural areas of Sørlandet has experienced the largest increase from the 1935 to the 1945 cohort.

We now turn to a description of age at first birth and first marriage for the different regions. These differentials are displayed in table 5.12. The patterns are remarkably similar to those observed for the 1935 cohort. The differences in age at marriage between the regions are fairly small, and the proportions who have had their first child before they are 25 years old, differ by 15-20 per cent. In all regions the proportions with a first birth before age 25 have increased. The proportions who have married at that age also seem to have increased.

Another characteristic of the regional differentials in family formation is that it is more usual for women in the north to have a child when they marry than it is elsewhere. This applies to the 1945 as well as the 1935 cohort. Sørlandet has the lowest propensity of premarital childbirths.

5.4.2 Average number of children by place of residence

With respect to the regional differences in the number of children very little has changed from the 1935 to the 1945 cohort. The lowest figure is found in Østlandet, where there is an average of 1.96 children for the women living in the non-rural districts, and the highest figure, 2.80, is found in the rural areas of Nord-Norge. This makes a total difference of 0.84, which is slightly lower than for the 1935 cohort, in which the difference was 0.95.

Table 5.11 Relation between fertility at age 39, marital status at age 39 and place of residence at age 35. 1945 cohort.

Place of residence		Numbers	Per cent	Marital status	Per cent	Propor-tion childless (per cent)	Average number of child-ren
Øst-landet	non-rural	11036	40.6		100.0	11.3	1.96
				never married	7.9	77.9	0.28
				stable unions	69.1	5.1	2.12
				break-up	23.1	7.3	2.04
Øst-landet	rural	2813	10.3		100.0	7.7	2.31
				never married	5.6	79.5	0.29
				stable unions	81.2	3.2	2.45
				break-up	13.3	6.2	2.28
Sør-landet	non-rural	2538	9.3		100.0	8.1	2.37
				never married	5.3	85.1	0.16
				stable unions	77.7	3.1	2.54
				break-up	17.0	7.2	2.29
Sør-landet	rural	783	2.9		100.0	7.3	2.79
				never married	4.5	85.7	0.14
				stable unions	85.8	3.1	2.94
				break-up	9.7	7.9	2.70
Vest-landet	non-rural	3045	11.2		100.0	9.2	2.24
				never married	7.1	82.5	0.21
				stable unions	76.4	3.2	2.42
				break-up	16.5	5.6	2.29
Vest-landet	rural	1531	5.6		100.0	6.1	2.72
				never married	4.3	74.2	0.33
				stable unions	86.3	2.6	2.86
				break-up.	9.4	7.6	2.53
Trøn-delag	non-rural	1728	6.3		100.0	7.4	2.23
				never married	6.5	66.1	0.44
				stable unions	74.7	3.3	2.32
				break-up	18.8	3.1	2.45
Trøn-delag	rural	776	2.9		100.0	4.4	2.61
				never married	2.8	72.7	0.36
				stable unions	86.2	2.7	2.66
				break-up	11.0	1.2	2.80
Nord-Norge	non-rural	1970	7.2		100.0	7.0	2.33
				never married	6.9	53.3	0.69
				stable unions	73.5	3.4	2.45
				break-up	19.6	4.4	2.45
Nord-Norge	rural	993	3.6		100.0	5.5	2.80
				never married	6.3	52.4	0.71
				stable unions	79.5	2.0	2.93
				break-up	14.7	4.1	2.96
Total		27213	100.0				

Table 5.12 Some family formation parameters, by place of residence. 1945 cohort

Educa-tional level at age 35	Never marri-ed at age 39 [1]	Married Age un-known [1]	Married age 16-20 [1]	Married age 16-25 [1]	Child-less at age 39 [1]	First child at age 16-20 [1]	First child at age 16-25 [1]	First child born [1] year before marri-age or earlier [2]	same year [2]	year after marri-age or later [2]
Øst-landet n-r	7.9	2.3	25.0	75.2	11.3	20.1	62.6	4.4	24.9	70.8
r	5.6	2.0	31.0	79.4	7.7	25.7	70.9	5.0	29.8	65.1
Sør-landet n-r	5.3	2.3	30.1	80.9	8.1	22.0	70.6	4.1	23.4	72.5
r	4.5	1.8	33.2	81.6	7.3	22.7	73.4	2.7	22.8	74.6
Vest-landet n-r	7.1	1.2	24.6	76.7	9.2	18.9	66.8	5.3	26.2	68.3
r	4.3	1.2	30.8	81.1	6.1	23.2	75.0	5.2	29.1	65.7
Trøn-delag n-r	6.5	1.9	30.6	79.9	7.4	25.2	73.8	7.8	29.3	62.9
r	2.8	1.0	34.2	84.5	4.4	25.9	78.2	8.4	32.5	59.1
Nord-Norge n-r	6.9	1.4	29.5	78.6	7.0	27.7	75.3	14.8	29.8	55.4
r	6.3	1.6	33.2	78.6	5.5	33.3	79.4	21.8	27.7	50.4

[1] per cent of all women
[2] per cent of those of the women who have married before age 39 (and for whom
we know the age at marriage) and who have at least one child at that age

n-r = non-rural
 r = rural

The fertility for the never married differs considerably from region to region. In Sørlandet never married women living in rural districts have 0.14 children each and 86 per cent are childless. In Nord Norge the corresponding figures are 0.71 children and 52 per cent childless. In stable unions the number of children varies from 2.12 to 2.94, so the maximum regional difference is very close to the one we observe when all the women are grouped together.

The ranking of the regions is almost equal in the 1935 and the 1945 cohort. One of the few differences is that in the 1945 cohort Sørlandet shares the top ranking with Nord-Norge. Vestlandet had this position in the 1935 cohort. The 1945 figures are 86-90 per cent of the 1935 figures in all regions except the non-rural areas of Nord-Norge (84 per cent) and the rural part of Sørlandet (92 per cent).

The proportion childless differs slightly from one region to the other. Among stable couples the proportion is 5.1 in the non-rural part of Østlandet and 2.0-3.2 in the other 9 regions. When all women are grouped together irrespective of marital status, the corresponding figures are 11.3 and 4.4-9.2. The proportions are lowest in Trøndelag and Nord-Norge.

5.4.3. Net effect of place of residence on fertility

In this section we focus on the regression models estimated for the stable unions (see table 5.8). In univariate calculations we observe that the difference between the region with highest and the region with lowest fertility is 0.82. In the multivariate models the difference is reduced to 0.67. If the childless are excluded and variation in first birth timing is controlled for, the difference is reduced further to 0.63. Besides, we observe that the rural part of Sørlandet has a fertility which is 0.09 higher than Nord-Norge. This is due to the high propensity of premarital births in Nord-Norge.

5.5 Sociodemographic fertility differentials at age 39 in the 1945 cohort based on multivariate regression models

In table 5.8, which shows a regression model for stable unions, we see that region and age at marriage have a large net impact on fertility, while education is of much less importance. In addition, having a child before marriage increases fertility with 0.5.

The effect of woman's occupation is very similar to that observed for the 1935 cohort, except that administrative and clerical work is associated with a significantly lower fertility than the industrial sector.

As we found for the 1935 cohort, husband's occupation has a somewhat smaller impact on fertility than the woman's occupation. Compared to men working with industry and craft, those engaged in medical work, religious work, wood work and agriculture have significantly higher fertility. On the other hand, clerks have lower fertility.

Husband's education has a small but significant positive net effect on fertility, and so has parents' education.

With respect to religion, we observe also for the 1945 cohort that couples belonging to another society than the Norwegian Church have high fertility. The effect according to table 5.8 is 0.6, while it was 0.5 for the 1935 cohort. However, we have found no effect of not belonging to any religious society, as we found for the 1935 cohort.

For the 1945 cohort we have also inspected the association between income at age 35 (the part of the income from 1 November 1979 to 1 November 1980 on which the pension is based) and number of children at age 39. Similar calculations could have been made for other cohorts and for other ages, but we have not given priority to this - mainly because the 1945 study apparently gives very little interesting insight.

Our strategy was to include income in the regression model for fertility among stable couples (see table 5.8). The effects of income estimated in multivariate models are shown in table 5.13. It appears that the woman's income at age 35 is inversely related to the number of children at age 39. With respect to husband's income, there is no effect on fertility. In univariate models we find a fairly large negative effect of being married to a man with a very small income (and in most cases exactly 0), but this is not seen in multivariate models. As referred in chapter 2, there are a few couples for whom the husband's education, occupation and income are unknown, and they have considerably smaller

Table 5.13   Estimated effects of income at age 35 on the number of
             children at age 39 for women living in stable unions.
             1945 cohort

			Number of women	Univariate models[1]	Multivariate models[2]	
					effect estimate	t-value
Woman's	0-	999	4914	0.27	0.25	(9.1)
income	1 000- 24	999	5003	0.17	0.15	(7.4)
	25 000- 49	999	5052	0.00	0.00	
	50 000- 74	999	3316	-0.26	-0.16	(-7.8)
	75 000 and	more	2061	-0.62	-0.41	(-15.6)
Husband's	0-	999	441	-0.85	0.02	(0.2)
income	1 000- 24	999	350	-0.01	0.04	(0.7)
	25 000- 49	999	673	0.00	0.00	
	50 000- 74	999	1957	-0.04	0.05	(1.2)
	75 000- 99	999	7245	-0.18	0.02	(0.4)
	100 000-124	999	5360	-0.19	0.05	(1.2)
	125 000-149	999	2346	-0.18	0.06	(1.4)
	150 000-174	999	1048	-0.18	0.03	(0.7)
	175 000 and	more	926	-0.09	0.11	(2.2)

[1] estimated effect of income according to a univariate model
[2] estimated effect of income according to a model where all variables
    in table 5.8 except timing of first birth is included together with
    husband's income and woman's income

families than average. This is primarily because a large proportion of these
couples have married after 1980.

The fact that husband's income has no effect on fertility explains why
inclusion of this variable does not influence the other parameter estimates -
even though there are large differences in the income profile between the diffe-
rent groups. For instance, we have calculated the proportion of men with income
lower than 75000 at age 35, and found a considerable variation (see table
5.14). Among men enganged in technical, scientific or juridical work only 3 per
cent are in this low income group, as opposed to 55 per cent within the agricul-
tural sector. To give an example from the other end, there are 53 per cent of
the men in the medical sector who have an income higher than 15000, and none
within religious work.

When woman's income is also included in the model, the effects of occupation
on fertility are changed. This is due to a strong correlation between income and
fertility and between income and woman's occupation. The income profiles for
different occupations are shown in table 5.15. Among the employed women the pro-
portion with income lower than 1000 is particularly large in the hotel and
restaurant sector (44 per cent), whereas no women in graphic work have such a
small income. On the other hand, within administration 56 per cent have income
higher than 75000, while the corresponding figure is 1 per cent within agricul-
ture.

Table 5.14 Proportion of husbands with income less than
75 000 or higher than 150 000. Per cent

Husband's occupation	Income less than 75 000	Income higher than 150 000
Not employed, unknown	60.8	4.5
Technical, scientific, juridical work	2.9	19.3
Artistic, literary work	11.5	10.8
Medical work	6.8	53.1
Pedagogical work	5.3	9.1
Religious work	28.6	0.0
Administration	9.1	22.9
Clerical work	8.3	7.4
Sales work, commerce	15.7	9.3
Agriculture, fishing	55.3	4.0
Transport	13.3	9.8
Wood work	33.3	1.1
Graphic work	4.9	5.8
Industry, craft (excl. wood, graphic work)	12.1	3.2
Hotel, restaurant	18.1	5.6
House porter, charwork	25.5	1.0
Other occupations	14.6	8.0

Table 5.15 Income distribution for women. Per cent

Woman's occupation	0-999	1000-24999	25000-49999	50000-74999	75000 and more	Total
Not employed	68.5	27.4	2.5	1.0	0.6	100.0
Technical, scientific, juridical work	0.2	15.2	29.6	22.1	32.9	100.0
Artistic, literary work	5.9	16.2	22.1	20.6	35.3	100.0
Medical work	0.5	14.8	34.9	31.9	18.0	100.0
Pedagogical work	0.5	12.4	22.4	28.9	35.8	100.0
Administration	1.5	6.2	15.3	21.5	55.6	100.0
Clerical work	1.2	16.4	37.9	31.1	13.5	100.0
Sales work, commerce	2.9	28.8	45.7	18.0	4.6	100.0
Agriculture, fishing	23.2	38.8	30.8	5.9	1.3	100.0
Graphic work	0.0	9.5	28.6	21.4	40.5	100.0
Industry, craft (excl. graphic work)	1.2	17.9	38.7	32.7	9.6	100.0
Hotel, restaurant	3.6	44.3	30.3	15.7	6.1	100.0
House porter, charwork	1.0	38.8	46.6	11.3	2.2	100.0
Other occupations	9.4	26.4	34.6	18.0	11.7	100.0

Table 5.16 shows how the effects on fertility of woman's occupation are influenced by inclusion of woman's and husband's income. It appears that the low fertility within administration and graphic work found earlier is partly "explained" by high income. Likewise, the high fertility within agriculture and the service sector (hotel and restaurant work, charwork) is "explained" by low income. We will strongly emphasize that this is no true explanation of fertility variations. For instance, the woman may have chosen charwork because they have many children and this sector offers part time employment.

5.6   Large families

This section is devoted to a brief study of very large families, which we have defined to be couples with five or more children. In the 1945 cohort 2.8 per cent of all women who still live in first marriage at age 39 and have not experienced a dissolution, have such a large family. To analyse variations in small proportions like this, a fairly large data set is required. Since our population comprises more than 20000 women who live in first marriage, we should be able to draw some conclusions that may be considered reliable. We do not believe that this topic deserves a comprehensive analysis, so our study is confined to the 1945 cohort exclusively, women in first marriage at age 39 and cumulated fertility at that age.

In this population 3.8 per cent are childless, 9.5 per cent have one child, 45.9 per cent have two children, 29.4 per cent have three children, 8.6 per cent have four children, and 2.8 per cent have five or more children.

Table 5.16   Net effect of woman's occupation on fertility

Woman's occupation	Multivariate model	
	same variables as in table 5.8	same variables as in table 5.8 + husband's and wife's income
Not employed	0.41	0.13
Technical, scientific, juridical work	-0.03	0.01
Artistic, literary work	0.10	0.13
Medical work	0.17	0.19
Pedagogical work	0.10	0.15
Administration	-0.23	-0.08
Clerical work	-0.15	-0.15
Sales work, commerce	-0.04	-0.11
Agriculture, fishing	0.31	0.16
Graphic work	-0.16	-0.05
Industry, craft (excl. graphic work)	0.00	0.00
Hotel, restaurant	0.15	0.06
House porter, charwork	0.34	0.25
Other occupations	0.11	0.06

There are large social and regional variations. For instance, the proportion with five or more children is 3.9 per cent among women with only primary education and only 0.4 among women with the highest education. In the non-rural areas of Østlandet it is 0.8 per cent, and in the rural areas of Sørlandet it is 10.3 per cent.

Rather than showing detailed tables with parity distributions, we will draw attention to a few groups where the proportion with five or more children is higher than 5 per cent. Table 5.17 speaks for itself. We are able to identify groups consisting of 50-200 women where 16-20 per cent have large families. These groups are found by combining characteristics like: living in a rural area (in particular Sørlandet), working in agriculture, fishing or forestry, being member of a religious society other than the Norwegian Church, or having low education. Combining all these characteristics makes no sense, as the group would be too small as long as we include only one cohort in our study.

Table 5.17   Proportion of stable couples with five or more children at age 39 in various groups of women born 1945. Per cent

Group	Number of women	Proportion
TOTAL GROUP		
Couples living in first marriage	20 387	2.8
SUBGROUPS		
Couples living in rural parts of:		
Sørlandet ...	668	10.3
Vestlandet ..	1 319	6.3
Trøndelag ...	669	5.7
Nord-Norge ..	784	9.3
Couples in which the woman is working in the agricultural[2]) sector	673	7.9
Couples in which the husband is engaged in religious work	63	7.9
Couples in which the husband is engaged in agricultural[2]) work	1 424	7.6
Couples in which both are members of a religious society other than the Norwegian Church	420	11.2
Couples living in rural parts of Sørlandet, Vestlandet, Trøndelag or Nord-Norge and in which both are members of a religious society other than the Norwegian Church	50	20.0
Couples living in rural parts of Sørlandet and in which both are working in the agricultural[2]) sector	[1])	17.2
Couples in which both are working in the agricultural[2]) sector, and in which both have only primary education	195	15.9

[1]) not calculated, but roughly estimated to about 50
[2]) includes fishing and forestry

6. NUMBER OF CHILDREN AT AGE 29 AMONG WOMEN BORN 1945

In this chapter we present results on childlessness and number of children at age 29 for the 1945 cohort. The main reason why we repeat the calculations in chapter 5 for another age is that we intend to compare with the 1955 cohort, which can only be observed up to this age. Besides, we also want to obtain some information on the dynamics of fertility in the 1945 cohort. For instance, by comparing fertility at ages 29 and 39 we are able to draw conclusions about compensation for low fertility in an early stage of the life cycle.

There will not be any elaborate discussion of each table. In chapter 7, we will return to some of the tables when we draw parallels between the 1945 and 1955 cohort.

6.1 Relation between marital status, age at marriage and fertility

As indicated in table 6.1, the number of children at age 29 was 1.77. 10.9 per cent had never married, 7.6 per cent had experienced a marital dissolution (i.e., 8.5 per cent of the marriages dissolved). The number of children among the stable couples was 1.97.

Table 6.1 Fertility at age 29 by marital status at age 29.
        1945 cohort.

	Number of women	Per cent	Average number of children	Proportion childless (per cent)
Total population	27213	100.0	1.77	16.1
never married	2963	10.9	0.21	82.3
still in first marriage	22183	81.5	1.97	7.9
experienced dissolution	2067	7.6	1.88	10.0

The number of women who have married at age 15, 16 ...., 29 is, of course, equal to the number we found in the previous chapter, but the fertility is lower (table 6.2). This difference between number of children at age 29 and 39 is larger the older the women are at marriage. For instance, those marrying at age 20 get 0.25 children between age 29 and 39, and those marrying at age 25 get 0.75 children. Stated differently, there is a compensation for a late start.

At age 29 89.1 per cent of the women have married. Of those who have married, 31.3 per cent did so at age 16-20 and 87.3 per cent at age 16-25. In addition, the age at marriage is unknown for 2.1 per cent of the ever married women. Most of these women probably married as teenagers.

Table 6.2 Average number of children at age 29 by age at marriage[1]).
1945 cohort

	Number of women	Average number of children	Proportion who have ex-perienced a dissolution (per cent)	Average number of children among those	
				living in first marriage	who have ex-perienced a dissolution
Total population	27213	1.77			
Never married	2963	0.21			
Previously or currently married	24250	1.96	8.5	1.97	1.88
Age at marriage:					
15	3	-	-	-	-
16	56	2.96	10.7	2.94	-
17	464	2.91	10.8	2.93	2.78
18	1358	2.73	7.4	2.74	2.53
19	2463	2.54	7.7	2.56	2.29
20	3239	2.35	10.7	2.40	1.98
21	3590	2.11	9.0	2.15	1.72
22	3392	1.98	5.8	2.02	1.41
23	2877	1.77	5.7	1.81	1.21
24	2228	1.58	4.2	1.60	1.10
25	1494	1.36	3.7	1.38	0.89
26	1066	1.16	3.1	1.16	0.91
27	692	0.95	1.0	0.95	-
28	452	0.72	0.7	0.72	-
29	379	0.40	0.3	0.40	-
unknown	516	2.27	96.5	2.28	2.27

[1]) averages are not calculated for groups smaller than 10.

The effect of marital instability is smaller at age 29 than at age 39 if we compare the effects calculated in tables 5.1 and 6.1, but in the multivariate models an opposite result is observed. Table 6.3 shows that couples who have ex-perienced a break-up, have 0.37 children less than the rest of the ever married women. The corresponding figure at age 39 is 0.22. For further illustration let us focus on women who marry at age 20. At age 29 the fertility is 2.40 and 1.98 for women in stable marriages and broken marriages, respectively. At age 39 the corresponding figures are 2.65 and 2.45. Apparently, the 10 years between age 29 and 39 have a compensatory effect, as some of those who dissolve the marriage before age 29 enter a new union and make up for their "lost childbirths". After age 29 new couples split up, but at long marital durations fertility is lower, and the effect of a break is therefore smaller. In this context one should also take into account that those who split up after age 29 are not only likely to "lose childbirths" later on, but probably also have a slightly lower number of children at the time of the separation. We know from other studies that the women who are childless or have one child (which is a fairly small group at, say, 10 years duration) have higher divorce rates than the women with two or three children (Kravdal and Noack, 1988).

Table 6.3. Regression models for number of children at age 29 among women who are or have been married. 1945 cohort.

	Number of women incl. 1924 child- less at age 29	Univariate models	Multivariate models			
		incl.1924 childless at age 29	incl.1924 childless at age 29		excl.1924 childless at age 29	
		effect estimate	effect estimate	t-value	effect estimate	t-value
Educational level [1])						
(linear)		-0.217	-0.042	(- 7.5)	-0.015	
Place of residence [1])						
Østlandet non-rural	9599	-0.39	-0.21	(-11.0)	-0.18	
*Østlandet rural	2546	0.00	0.00		0.00	
Sørlandet non-rural	1987	-0.03	0.02	(0.7)	0.04	
Sørlandet rural	688	0.23	0.22	(6.2)	0.25	
Vestlandet non-rural ...	2707	-0.17	-0.02	(- 0.7)	-0.01	
Vestlandet rural	1334	0.27	0.28	(9.8)	0.26	
Trøndelag non-rural	1464	-0.13	-0.05	(- 2.0)	-0.09	
Trøndelag rural	752	0.21	0.20	(5.8)	0.15	
Nord-Norge non-rural ...	1764	-0.02	0.05	(1.8)	-0.03	
Nord-Norge rural	867	0.38	0.39	(11.6)	0.26	
Age at marriage (linear) .		-0.198	-0.190	(-86.4)	-0.160	
Marital status [2])						
first marriage(no break)		0.00	0.00		0.00	
experienced dissolution		-0.21	-0.37	(-16.7)	-0.32	
Timing of first birth						
1+ year before marriage	1258				0.67	(29.8)
same year as marriage ..	6184				0.23	(20.5)
*1+ year after marriage .	14342				0.00	
R[2] statistics for the model			0.31		0.29	

[1]) when the women were 25 years old
[2]) when the women were 29 years old

* Baseline group

6.2 Relation between number of children and the timing of first birth relative to marriage

We observe in table 6.3 that an early first birth increases fertility with 0.67 (according to a multivariate model). This figure was 0.51 at age 39. This difference probably also has to do with compensatory effects. Starting childbearing early gives an "advantage" early in marriage, but year by year the others partly catch up.

Table 6.4. Regression models for number of children at age 29 among women who have experienced a marital break-up. 1945 cohort.

	Number of women incl. 188 child-less at age 29	Univariate models incl. 188 childless at age 29 effect estimate	Multivariate models incl. 188 childless at age 29 effect estimate	t-value	excl. 188 childless at age 29 effect estimate	t-value
Educational level [1])						
(linear)		-0.311	-0.159	(- 6.3)	-0.079	
Place of residence [1])						
Østlandet non-rural	810	-0.41	-0.21	(- 2.4)	-0.16	
*Østlandet rural	132	0.00	0.00		0.00	
Sørlandet non-rural	108	-0.16	-0.07	(- 0.6)	0.05	
Sørlandet rural	25	-0.14	-0.03	(- 0.1)	0.07	
Vestlandet non-rural ...	184	-0.19	-0.09	(- 0.9)	-0.02	
Vestlandet rural	39	0.04	0.11	(0.7)	0.13	
Trøndelag non-rural	89	0.15	0.17	(1.3)	0.09	
Trøndelag rural	30	0.32	0.25	(1.4)	0.18	
Nord-Norge non-rural ...	109	-0.09	0.00		-0.03	
Nord-Norge rural	40	0.44	0.54	(3.2)	0.36	
Age at marriage (linear) .		-0.237	-0.119	(- 6.7)	-0.099	
Number of years married [2])						
(linear)		0.200	0.102	(6.9)	0.095	
Timing of first birth						
1+ year before marriage	140				0.72	(9.2)
same year as marriage ..	491				0.14	(3.0)
*1+ year after marriage .	747				0.00	
R² statistics for the model			0.28		0.26	

[1]) when the women were 25 years old
[2]) when the women were 29 years old

* Baseline group

6.3 Relation between educational level and fertility

As expected, the proportion who have atlained educational level 6 is lower at age 25 than at age 35, and a larger proportion is still on level 2 or 3. However, the differences are not very large (see table 6.5).

At age 29 the difference in fertility between level 2 and level 6+7 (taking the weighted average, as usual) is almost 1 child (1.98-1.01=0.97). This is much higher that it was at age 39, when the figures were 2.38 and 1.80.

Table 6.5 Relation between fertility at age 29, marital status at age 29 and educational level at age 25. 1945 cohort.

Educational level	Numbers	Per cent	Marital status	Per cent	Proportion childless (per cent)	Average number of children
2 (7-9 years school attendance)	14688	54.0		100.0	12.4	1.98
			never married	8.9	74.1	0.33
			stable unions	81.9	6.2	2.16
			break-up	9.2	7.5	2.07
3 (10 years school attendance)	6347	23.3		100.0	15.2	1.71
			never married	9.7	83.1	0.19
			stable unions	83.8	7.9	1.88
			break-up	6.5	8.5	1.74
4 (11-12 years school attendance)	3295	12.1		100.0	23.4	1.43
			never married	15.4	88.6	0.12
			stable unions	79.1	10.9	1.69
			break-up	5.6	20.2	1.31
5 (13-14 years school attendance)	2266	8.3		100.0	24.4	1.31
			never married	14.8	93.7	0.07
			stable unions	81.1	11.5	1.55
			break-up	4.1	28.0	1.08
6 (15-16 years school attendance)	402	1.5		100.0	36.8	1.03
			never married	21.6	98.9	0.01
			stable unions	74.1	18.8	1.34
			break-up	4.2	35.3	0.82
7 (17-18 years school attendance)	100	0.4		100.0	37.0	0.94
			never married	20.0	100.0	0.00
			stable unions	77.0	19.5	1.21
			break-up	3.0	66.7	0.33
Other levels, missing	115	0.4				
Total	27213	100.0				

The women with high education get more children in their thirties than the other women. In order to examine this in more detail, we compare tables 5.9 and 6.5, which display the relation between educational level at age 25 and cumulated fertility at age 39 and 29, respectively. We find that women who had level 2 at age 25, increase their fertility from 1.98 to 2.36 between age 29 and 39, and those at level 7 increase their fertility from 0.94 to 1.74. The latter increase is the double of the former (0.80 as opposed to 0.38). At level 6 the increase from age 29 to 39 is as high as 0.94.

The fact that the educational fertility differentials are larger at age 29 than at age 39 is also observed in multivariate models. The effect on cumulated fertility of education is significantly negative at age 29 (-0.04 per level), but not significantly different from 0 at age 39 (see table 6.3 and 5.3).

Table 6.6 Some family formation parameters, by educational level. 1945 cohort

Educa-tional level at age 25	Never married at age 29 [1]	Married			Child-less at age 29 [1]	First child at age		First child born		
		age un-known [1]	age 16-20 [1]	age 16-25 [1]		16-20 [1]	16-25 [1]	year before marri-age or earlier [2]	same year [2]	year after marri-age or later [2]
2 [3]	8.9	2.7	37.7	81.1	12.4	32.4	77.5	8.3	33.6	58.0
3	9.7	1.3	25.4	80.0	15.2	17.8	68.5	3.2	25.9	70.9
4	15.4	0.8	9.8	70.1	23.4	5.3	53.4	2.2	21.7	76.1
5	14.8	0.3	3.9	68.1	24.4	1.9	42.7	1.1	12.5	86.4
6	21.6	0.0	3.0	56.5	36.8	1.0	27.4	1.6	7.5	90.9
7	20.0	1.0	0.0	63.0	37.0	1.0	18.0	0.0	3.2	96.8

[1] per cent of all women
[2] per cent of those of the women who have married before age 29 (and for whom we know the age at marriage) and who have at least one child at that age
[3] see explanation table 6.5

6.4 Regional fertility differentials

Table 6.8 shows that the internal net-migration is very small on a cohort level. The proportion who live in the non-rural areas of Østlandet decreases with 0.6 per cent from age 29 to age 39. On the other hand the non-rural areas of Sørlandet gain 0.9 per cent during the same period. These are the largest proportions observed. However, there is a considerable gross-migration (to be discussed in chapter 8.1).

Let us illustrate the interplay between fertility and migration with one region, the rural areas of Østlandet. At age 25 2882 live in this district, and 75 per cent of them have had a child before they were 25 years old. At age 35 2813 women live here, and 71 per cent of them have had a child at age 25. An interpretation of this may be that there has been an inmigration of women with a late first birth, and an outmigration of women with an early first birth. A similar structure is found for all rural districts except in Nord-Norge.

Returning to table 6.8 we observe that the maximum difference in fertility between the regions is 0.67 for all the women and 0.75 for the stable couples. At age 39 the corresponding figures were 0.84 and 0.82. This means that women living in the central areas of Østlandet do not make up for their low fertility in their thirties. On the contrary, the differential is widening. Women who live in the rural areas of Sørlandet at age 25 get 0.58 children between age 29 and 39 and those living in the non-rural areas of Østlandet get 0.44 children.

Table 6.7. Regression models for number of children at age 29 among women living in stable unions. 1945 cohort.

	Number of women incl. 1736 child- less at age 29	Univariate models incl. 1736 childless at age 29 effect estimate	Multivariate models			
			incl. 1736 childless at age 29		excl. 1736 childless at age 29	
			effect estimate	t- value	effect estimate	t- value
Educational level [1]						
(linear)		-0.214	- 0.023	(- 3.2)	0.000	
Place of residence [1]						
Østlandet non-rural	8789	-0.38	-0.11	(- 5.7)	-0.10	
*Østlandet rural	2414	0.00	0.00		0.00	
Sørlandet non-rural	1879	-0.02	0.09	(3.4)	0.09	
Sørlandet rural	663	0.25	0.21	(5.8)	0.24	
Vestlandet non-rural ...	2523	-0.17	0.05	(2.0)	0.04	
Vestlandet rural	1295	0.28	0.26	(9.2)	0.25	
Trøndelag non-rural	1375	-0.15	0.01	(0.3)	-0.03	
Trøndelag rural	722	0.20	0.16	(4.7)	0.12	
Nord-Norge non-rural ...	1655	-0.01	0.10	(3.9)	0.03	
Nord-Norge rural	827	0.37	0.34	(10.4)	0.23	
Age at marriage (linear) .		-0.200	-0.148	(-48.6)	-0.134	
Timing of first birth						
1+ year before marriage	1118				0.62	(26.5)
same year as marriage ..	5693				0.22	(18.9)
*1+ year after marriage .	13595				0.00	
Occupation [1]						
not employed	11496	0.80	0.48	(15.2)	0.27	
technical, scientific,						
juridical work	351	-0.22	0.06	(1.2)	0.02	
artistic, literary work	72	-0.14	0.09	(0.9)	0.08	
medical work	1611	0.01	0.25	(6.6)	0.13	
pedagogical work	1263	0.02	0.20	(4.7)	0.07	
administration	28	-0.07	0.10	(0.6)	0.07	
clerical work	3306	-0.19	-0.02	(- 0.6)	-0.08	
sales work, commerce....	1067	-0.10	-0.07	(- 1.7)	-0.08	
agriculture, fishing ...	472	0.96	0.46	(8.7)	0.31	
graphic work	46	-0.16	-0.07	(- 0.6)	-0.16	
*industry, craft (excl.						
graphic work)	722	0.00	0.00		0.00	
hotel, restaurant	617	-0.18	-0.01	(- 0.3)	0.02	
house porter, charwork .	407	0.37	0.18	(3.6)	0.08	
other occupations	684	-0.06	0.01	(0.3)	-0.05	

cont.

Table 6.7 cont.

	Number of women incl. 1736 child-less at age 29	Univariate model incl. 1736 childless at age 29 effect estimate	Multivariate models			
			incl. 1736 childless at age 29		excl. 1736 childless at age 29	
			effect estimate	t-value	effect estimate	t-value
Husband's education [1])						
unknown [3])	3013	-1.01	-0.05	(- 1.0)	0.01	
low (2)	9089	0.26	-0.01	(- 1.0)	0.01	
* medium (3-5)	8787	0.00	0.00		0.00	
high (6-7)	1253	-0.16	0.02	(0.8)	0.01	
Husband's occupation [1])						
not employed, unknown [3])	3431	-1.10	-0.05	(- 1.3)	-0.06	
technical, scientific, juridical work	1656	-0.27	0.02	(0.8)	0.03	
artistic, literary work	165	-0.39	-0.07	(- 1.1)	-0.03	
medical work	234	-0.14	0.12	(2.1)	0.11	
pedagogical work	925	-0.27	-0.03	(- 0.8)	0.00	
religious work	29	0.01	0.22	(1.5)	0.48	
administration	527	-0.18	0.03	(0.7)	0.04	
clerical work	1169	-0.29	-0.03	(- 1.4)	-0.02	
sales work, commerce	1468	-0.15	0.01	(0.3)	0.01	
agriculture, fishing	1187	0.32	0.18	(6.1)	0.18	
transport	2430	0.01	0.00		-0.01	
wood work	1058	0.16	0.10	(3.7)	0.10	
graphic work	227	-0.27	-0.12	(- 2.2)	-0.07	
*industry, craft (excl. wood, graphic work)	6415	0.00	0.00		0.00	
hotel, restaurant	242	-0.22	-0.10	(- 1.8)	-0.09	
house porter, charwork	90	0.11	0.10	(1.1)	0.08	
other occupations	889	-0.18	-0.01	(- 0.3)	-0.02	
Couple's religion [1])						
both members of						
* Norwegian Church	17459	0.00	0.00		0.00	
other rel. society	339	0.25	0.23	(5.2)	0.33	
none member of rel. soc.	110	-0.21	-0.01	(- 0.1)	-0.01	
restgroup [3])	4234	-0.84	-0.01	(- 0.5)	0.00	
Parents' education [4])						
unknown, not living with parents at age 15	197	0.29	0.14	(2.4)	0.09	
*low education (2)	19734	0.00	0.00		0.00	
medium education (3-5)	1556	-0.21	-0.04	(- 1.6)	-0.02	
high education (6-7)	655	-0.36	0.02	(0.7)	0.07	
R² statistics for the model			0.36		0.33	

[1]) when the women were 25 years old
[3]) including women who had not yet married at age 29
[4]) when the women were 15 years old

* Baseline group

Table 6.8 Relation between fertility at age 29, marital status at age 29 and place of residence at age 25. 1945 cohort

Place of residence		Numbers	Per cent	Marital status	Per cent	Proportion childless (per cent)	Average number of children
Øst-landet	non-rural	11217	41.2		100.0	19.8	1.54
				never married	12.1	85.7	0.17
				stable unions	78.6	10.6	1.73
				break-up	9.3	12.0	1.70
Øst-landet	rural	2882	10.6		100.0	13.2	1.94
				never married	9.1	82.1	0.22
				stable unions	83.8	6.3	2.11
				break-up	7.0	5.4	2.14
Sør-landet	non-rural	2234	8.2		100.0	14.0	1.91
				never married	8.8	88.8	0.12
				stable unions	84.2	6.4	2.09
				break-up	7.0	10.9	1.97
Sør-landet	rural	762	2.8		100.0	12.3	2.17
				never married	7.9	93.3	0.07
				stable unions	87.3	5.1	2.36
				break-up	4.9	10.8	2.14
Vest-landet	non-rural	3113	11.4		100.0	17.1	1.73
				never married	11.5	86.0	0.17
				stable unions	81.2	7.9	1.94
				break-up	7.3	11.0	1.88
Vest-landet	rural	1491	5.5		100.0	11.6	2.17
				never married	9.6	80.4	0.23
				stable unions	86.9	4.3	2.39
				break-up	3.6	5.7	2.04
Trøn-delag	non-rural	1669	6.1		100.0	13.5	1.80
				never married	10.4	79.2	0.27
				stable unions	82.5	6.0	1.96
				break-up	7.1	5.0	2.17
Trøn-delag	rural	840	3.1		100.0	11.6	2.11
				never married	9.6	76.5	0.26
				stable unions	86.1	4.8	2.31
				break-up	4.3	0.0	2.31
Nord-Norge	non-rural	1983	7.3		100.0	11.7	1.94
				never married	9.2	67.2	0.40
				stable unions	83.6	5.7	2.10
				break-up	7.2	9.9	2.05
Nord-Norge	rural	1022	3.8		100.0	11.6	2.21
				never married	14.1	56.3	0.56
				stable unions	80.9	4.4	2.48
				break-up	5.0	3.9	2.53
Total		27213	100.0				

(These figures are based on tables 6.8 and 8.7, but we get almost the same result when we compare tables 6.8 and 5.11, as fertility at age 39 for the different regions does not depend much on whether we group by place of residence at age 35 or place of residence at age 25.)

Table 6.9 Some family formation parameters, by place of residence. 1945 cohort

		Never married at age 29 [1]	Married age un-known [1]	Married age 16-20 [1]	Married age 16-25 [1]	Child-less at age 29 [1]	First child at age 16-20 [1]	First child at age 16-25 [1]	First child born year before marri-age or earlier [2]	First child born same year [2]	First child born year after marri-age or later [2]
Øst-landet	n-r	12.1	2.2	23.7	74.3	19.8	18.9	61.1	3.9	26.2	69.8
"	r	9.1	2.5	34.5	81.7	13.2	28.8	75.3	4.8	33.2	62.1
Sør-landet	n-r	8.8	2.2	31.7	81.4	14.0	22.2	72.2	3.5	25.2	71.3
"	r	7.9	1.6	35.3	84.0	12.3	25.9	76.0	3.0	27.0	69.9
Vest-landet	n-r	11.5	1.4	23.4	76.9	17.1	17.7	66.0	4.3	27.6	68.1
"	r	9.6	0.9	33.8	82.4	11.6	26.4	77.6	4.1	32.5	63.4
Trøn-delag	n-r	10.4	1.9	28.8	80.0	13.5	23.6	71.7	6.4	27.5	66.1
"	r	9.6	0.7	35.0	83.1	11.6	28.0	79.9	8.8	35.7	55.6
Nord-Norge	n-r	9.2	1.8	30.8	80.1	11.7	27.8	76.1	12.9	32.1	55.0
"	r	14.1	1.0	32.9	76.0	11.6	35.1	79.6	23.6	29.7	46.8

[1] per cent of all women
[2] per cent of those of the women who have married at age 29 (and for whom we know the age at marriage) and who have at least one child at that age

n-r = non-rural
 r = rural

6.5 Effect of other sociodemographic variables on fertility at age 29 in the 1945 cohort

The impact on the number of children at age 29 of the socioeconomic vari-ables is somewhat different from what we found at age 39. Only women engaged in medical work,. pedagogical work, charwork or agriculture have significantly higher fertility than those in the industrial sector (see table 6.7). No groups have significantly lower fertility, whereas clerks and women in administration had low fertility when we considered age 39.

Couples in which the husband is engaged in medical work, wood work or agriculture have high fertility, and if he is engaged in graphic work they have low fertility.

In contrast to what we found for age 39, it seems that husband's and parents' education have no significant effect on fertility.

Belonging to another religious society than the Norwegian Church tends to increase fertility, but not so much as we found for age 39 and as we have found for other cohorts and ages.

7. NUMBER OF CHILDREN AT AGE 29 AMONG WOMEN BORN 1955

In this chapter we present results for the 1955 cohort. The focus is on the number of children at the end of 1984, and we analyse the variation in the light of individual characteristics recorded in the 1980 census.

A main objective of this chapter is to draw parallels with the fertility at age 29 for the 1945 cohort. Comparing the two cohorts will, hopefully, yield important insight into the most recent changes in fertility.

7.1 Relation between marital status, age at marriage and fertility

7.1 1. Marital status and fertility

28201 women born 1955 are included in our population under study, and their average number of children at age 29 is 1.39 (see table 7.1). This is 0.38 lower than observed for the 1945 cohort at the same age, and if there is no compensation at a later stage in life, the completed fertility will be 1.84. (This very rough projection assumes that the women born 1955 will have the same average number of children in their thirties as the 1945 cohort.)

A further inspection of table 7.1 reveals that as much as 22.1 per cent have not married at the age of 29. This is almost twice the proportion 10 years earlier (which was 10.9 per cent). Besides, the fertility of the never married has increased from 0.21 to 0.35.

Table 7.1 Fertility at age 29 by marital status at age 29.
          1955 cohort.

	Number of women	Per cent	Average number of children	Proportion childless (per cent)
Total population	28201	100.0	1.39	24.4
never married	6230	22.1	0.35	72.3
still in first marriage	18818	66.7	1.70	10.4
experienced dissolution	3153	11.2	1.54	13.4

Divorce and separation rates have also escalated. 14.4 per cent of the women who have married, have subsequently split up (11.2 per cent of the whole population). The corresponding proportion for the 1945 cohort was 8.5 per cent.

It was pointed out in chapter 5 that the drop in fertility from the 1935 to the 1945 cohort, when all women were grouped together, was very close to the drop observed for stable unions. The fertility decline for stable couples in the 1955 cohort is 0.27, which is lower than the 0.38 observed for the complete sample.

If we use the marital status specific fertility figures for the 1945 cohort

and the distribution by marital status corresponding to that observed for the 1955 cohort, we get a cumulated fertility of 1.57 at age 29. Thus, we might say that 0.20 of the total decline from 1.77 to 1.39 is "due to" changes in the family structure. We will not repeat the arguments from chapter 5, but merely state that marital dissolution explains very little. It is the increasing proportion of never married that is able to explain such a large part of the total decline.

7.1.2 Fertility by age at marriage

The average number of children by age at marriage is shown in table 7.2, and the usual pattern appears. Comparing with the 1945 cohort, we find that for each age at marriage the number of children at age 29 has decreased. This decrease is larger the younger the bride is (0.54 at age 18, 0.37 at age 20, 0.28 at age 22, 0.08 at age 25 and 0.01 at age 27).

A similar result, though less marked, was found when we compared fertility at age 39 for the 1935 and 1945 cohort. It probably reflects that the fertility

Table 7.2   Average number of children at age 29 by age at marriage[1]).
           1955 cohort

	Number of women	Average number of children	Proportion who have experienced a dissolution (per cent)	Average number of children among those	
				living in first marriage	who have experienced a dissolution
Total population	28201	1.39			
Never married	6230	0.35			
Previously or currently married	21971	1.68	14.4	1.70	1.54
Age at marriage:					
15	3	-	-	-	-
16	75	2.21	42.7	2.26	2.16
17	578	2.28	36.9	2.39	2.08
18	1577	2.19	38.7	2.28	1.94
19	2515	2.10	22.0	2.18	1.79
20	3035	1.98	18.0	2.07	1.54
21	2964	1.86	15.1	1.92	1.47
22	2597	1.70	13.5	1.79	1.18
23	2193	1.59	10.3	1.64	1.11
24	1796	1.43	9.2	1.48	0.95
25	1339	1.28	7.4	1.31	0.92
26	1185	1.14	4.1	1.15	0.92
27	908	0.94	2.5	0.94	0.96
28	703	0.82	1.1	0.81	
29	503	0.45	0.0	0.45	
unknown	6				

[1]) averages are not calculated for groups smaller than 10.

decline is primarily due to fewer transitions to third and higher parities. Focusing on women marrying after they are 24 years old, it seems that those born 1955 have the same number of children during the first 5 years of their marriage as those born 10 years earlier. At very short durations (1-2 years) there even is a small increase, which is hardly surprising, as more women in their mid- or late twenties enter marriage with a child (Kravdal and Noack, 1988). This is not entirely offset by a decreasing proportion of pregnant brides.

We also want to point out that the proportion of early marriages is quite large in the 1955 cohort compared to the 1945 cohort. In the 1945 cohort about 28 per cent, or probably 30 per cent if we include those with an unknown age at marriage, married at age 16-20. In the 1955 cohort the corresponding proportion was also about 28 per cent. Relative to the proportion of women who have ever married, there are more early marriages in the 1955 cohort, however. Among those who had married before they were 29 years old in the 1955 cohort, 35.4 per cent married at age 16-20 and 85.0 per cent at age 16-25. This means that a larger proportion than in the 1945 cohort were younger than 20 and a larger proportion older than 25.

7.1.3 Net effect of marital instability and age at marriage

The effect of marital instability, which is shown in table 7.1, is 0.16. The corresponding effect for the 1945 cohort was 0.09. When we control for some other variables, the effect increases to 0.43 (see table 7.3), which is very close to what we found for the 1945 cohort (see table 6.3).

The net effect of age at marriage is 0.14 per year, which is equal to the effect estimated in univariate models. These figures are smaller than for the 1945 cohort, where the net effect was 0.19 and the univariate effect 0.20). The decrease in the effect that is obtained without control for other variables was commented in section 7.1.2.

7.1.4 The influence of number of years married

As for the other cohorts we have estimated regression models for women who have experienced a marital break-up (see table 7.4), and we observe once more that fertility tends to increase with increasing number of years married. The net effect for the 1955 cohort is 0.07 per year, which is somewhat smaller than for the 1945 cohort (0.10). Both these figures are higher than those obtained when we focus on fertility at age 39.

7.2 Relation between number of children and the timing of first birth relative to marriage

It is shown i table 7.3 that the net effect of having a child a year before marriage or earlier is 0.46. In the 1945 cohort the effect was as high as 0.67. Also the effect of having a child the same year as the marriage has decreased. In the 1945 cohort it was 0.23, and in the 1955 cohort it was 0.12.

Table 7.3. Regression models for number of children at age 29 among women who are or have been married. 1955 cohort.

	Number of women incl. 2208 child-less at age 29	Univariate models incl.2208 childless at age 29 effect estimate	Multivariate models incl.2208 childless at age 29 effect estimate	t-value	excl.2208 childless at age 29 effect estimate	t-value
Educational level [1] (linear)		-0.198	-0.069	(-14.1)	-0.022	
Place of residence [1]						
Østlandet non-rural	8330	-0.28	-0.13	(- 6.7)	-0.08	
*Østlandet rural	2014	0.00	0.00		0.00	
Sørlandet non-rural	2377	0.03	0.04	(1.6)	0.09	
Sørlandet rural	737	0.27	0.18	(5.4)	0.25	
Vestlandet non-rural ...	2691	-0.07	0.02	(1.0)	0.04	
Vestlandet rural	1338	0.30	0.25	(9.1)	0.22	
Trøndelag non-rural	1454	-0.07	0.04	(1.7)	-0.02	
Trøndelag rural	570	0.20	0.22	(6.1)	0.12	
Nord-Norge non-rural ...	1636	-0.04	0.12	(4.5)	0.00	
Nord-Norge rural	723	0.19	0.24	(7.1)	0.09	
Age at marriage (linear) .		-0.141	-0.139	(-70.8)	-0.110	
Marital status [2]						
* first marriage(no break)	18752	0.00	0.00		0.00	
experienced dissolution	3118	-0.17	-0.43	(-28.2)	-0.35	
Timing of first birth						
1+ year before marriage	2363				0.46	(29.2)
same year as marriage ..	5296				0.12	(11.2)
*1+ year after marriage .	12003				0.00	
R^2 statistics for the model			0.27		0.24	

[1] when the women were 25 years old
[2] when the women were 29 years old

* Baseline group

Table 7.4. Regression models for number of children at age 29 among women who have experienced a marital break-up. 1955 cohort.

	Number of women incl. 410 child-less at age 29	Univariate models incl. 410 childless at age 29 effect estimate	Multivariate models incl. 410 childless at age 29		excl. 410 childless at age 29	
			effect estimate	t-value	effect estimate	t-value
Educational level [1]						
(linear)		-0.297	-0.212	(-13.8)	-0.107	
Place of residence [1]						
Østlandet non-rural	1426	-0.22	-0.09	(- 1.5)	-0.05	
*Østlandet rural	216	0.00	0.00		0.00	
Sørlandet non-rural	354	0.10	0.11	(1.6)	0.12	
Sørlandet rural	64	0.09	0.03	(0.2)	0.34	
Vestlandet non-rural ...	349	-0.06	0.09	(1.2)	0.03	
Vestlandet rural	111	0.24	0.23	(2.4)	0.09	
Trøndelag non-rural	201	0.07	0.20	(2.5)	0.11	
Trøndelag rural	63	0.19	0.25	(2.1)	0.10	
Nord-Norge non-rural ...	252	0.00	0.17	(2.2)	0.03	
Nord-Norge rural	82	0.34	0.39	(3.6)	0.13	
Age at marriage (linear) .		-0.151	-0.072	(- 9.0)	-0.051	
Number of years married [2]						
(linear)		0.118	0.072	(11.1)	0.069	
Timing of first birth						
1+ year before marriage	443				0.52	(12.7)
same year as marriage ..	931				0.12	(402)
*1+ year after marriage .	1334				0.00	
R² statistics for the model			0.23		0.23	

[1] when the women were 25 years old
[2] when the women were 29 years old

* Baseline group

7.3   Relation between educational level and fertility

7.3.1 Educational level for women born 1955

When we compared the 1935 and 1945 cohort we found an increase in the educational level. This is a trend that has obviously continued (table 7.5). 54 per cent of the women in the 1945 cohort had level 2 at age 25. The corresponding proportion in the 1955 cohort was only 26 per cent. Furthermore, the proportion with higher education has increased. The proportions at level 5 are 8 per cent in the 1945 cohort and 16 per cent in the 1955 cohort, and at level 6+7 the proportions are 2 per cent and 4 per cent, respectively.

Table 7.5   Relation between fertility at age 29, marital status at age 29 and educational level at age 25.   1955 cohort

Educatio-nal level	Numbers	Per cent	Marital status	Per cent	Propor-tion childless (per cent)	Average number of child-ren
2	7432	26.4		100.0	13.6	1.73
(7-9 years			never married	16.4	51.4	0.66
school			stable unions	65.9	6.2	1.97
attendance)			break-up	17.7	6.6	1.82
3	10135	35.9		100.0	20.5	1.48
(10 years			never married	20.1	67.1	0.40
school			stable unions	69.1	8.2	1.79
attendance)			break-up	10.8	12.5	1.51
4	4650	16.5		100.0	30.3	1.18
(11-12 years			never married	24.8	77.5	0.27
school			stable unions	66.8	13.7	1.53
attendance)			break-up	8.5	23.2	1.14
5	4551	16.1		100.0	39.2	0.97
(13-14 years			never married	29.8	88.3	0.13
school			stable unions	64.6	17.0	1.37
attendance)			break-up	5.7	34.1	0.90
6	1082	3.8		100.0	40.8	0.92
(15-16 years			never married	29.1	91.4	0.09
school			stable unions	66.0	18.8	1.28
attendance)			break-up	4.9	35.9	0.96
7	130	0.5		100.0	42.8	0.81
(17-18 years			never married	28.5	89.2	0.14
school			stable unions	69.2	25.6	1.08
attendance)			break-up	2.3	0.0	1.00
Other levels, missing	221	0.8				
Total	28201	100.0				

7.3.2 Family formation and dissolution by educational level

As we have already pointed out, the proportion never married is much higher in the 1955 cohort than in the 1945 cohort. When the entire cohorts are considered, there has been an increase from 11 per cent to 22 per cent. Grouping by educational level, there was a variation from 9 per cent never married at level 2 to more than 20 per cent at the highest two levels in the 1945 cohort. These figures were 16 per cent and 29 per cent, respectively, in the 1955 cohort (table 7.6). Only at one educational level has the increase from the 1945 to the 1955 cohort exceeded 11 per cent. At the other levels the increase has been 7.5-10.5 per cent. As a conclusion, we state that the increase in the proportion never married from 11 to 22 per cent reflects an increase in educational level as well as an increasing proportion of unmarried women at a given educational level.

Table 7.6 Some family formation parameters, by educational level. 1955 cohort

								First child born		
Educational level at age 25	Never married at age 29 [1]	Married			Childless at age 29 [1]	First child at age		year before marriage or earlier [2]	same year [2]	year after marriage or later [2]
		age unknown [1]	age 16-20 [1]	age 16-25 [1]		16-20 [1]	16-25 [1]			
2 [3]	16.4	0.0	48.7	77.5	13.6	46.4	78.4	18.6	33.8	47.7
3	20.1	0.0	29.8	69.8	20.5	24.7	65.2	12.6	29.4	58.2
4	24.8	0.0	15.6	61.3	30.2	10.5	48.1	7.0	22.9	70.0
5	29.8	0.0	6.3	50.9	39.2	2.7	30.7	4.4	15.2	80.6
6	29.1	0.0	7.2	50.2	40.8	2.8	25.2	3.7	12.3	83.9
7	28.5	0.0	4.6	40.0	42.8	0.8	11.6	0.0	8.4	91.6

[1] per cent of all women
[2] per cent of those of the women who have married before age 29 (and for whom we know the age at marriage) and who have at least one child at that age
[3] see explanation table 7.5

Women born in 1955 exhibit a clear educational difference in their divorce pattern - and a much larger one than we have observed for the other cohorts and age groups. The proportion of the married who have experienced a dissolution declines steadily from 21 per cent at level 2 to 11 per cent at level 4 and 7 per cent at level 6. The corresponding figues for the 1945 cohort are 10 per cent, 7 per cent and 5 per cent. As we have emphasized several times such differentials undoubtedly reflect that age at marriage varies from one group to the other. We will briefly mention, however, that in divorce studies currently carried out a positive effect of education on marital stability is observed even when several controls are brought into consideration (Kravdal and Noack, 1989). The effect appears to be larger in the 1980s than in the 1970s.

When we compare the ages at first birth and first marriage in the 1955 cohort with those in the 1945 cohort (see tables 6.6 and 7.6) some interesting features appear. While teenage marriage and the proportion with a first birth before age 20 has increased at every educational level, the proportion with at least one child at age 25 or who are married at that age, has decreased. The proportion with at least one child or who have married at the age of 29 has also decreased. These trends appear at each educational level as well as on a more aggregate level. As we also referred to in section 7.1.2., it seems that there is more diversity with respect to the timing of family formation in the 1955 than in the 1945 cohort.

Another result that is documented in table 7.6 is that age at marriage and age at first birth rise with increasing education, and the prevalence of premarital fertility declines.

7.3.3 Average number of children by educational level

Women at level 2 have 1.73 children on the average, and those at level 6 and 7 have 0.91 (weighted average). The difference is 0.82. These figures should be compared to the 1945 cohort: 1.98 at level 2, 1.01 at level 6+7, and a difference of 0.97.

The overall decrease in the number of children from the 1945 to the 1955 cohort is 0.38 (1.77 to 1.39). 0.14 (about 37 per cent) of this decline is "explained" by the changing distribution over educational levels - using calculations similar to those presented earlier in this report (see section 5.3.1). The decrease in fertility at each educational level is 0.23-0.34, except at level 6+7, where it is 0.10. We found a similar development when we compared the cohorts 1935 and 1945, so it seems that the increasing group of women with high education are slowly catching up with the others.

For the stable couples in the 1955 cohort the fertility goes down from 1.97 at level 2 to 1.26 at level 6+7. The difference is 0.71, which is not much smaller than the overall difference of 0.82. For stable couples in the 1945 cohort the fertility was 2.16 at level 2 and 1.31 at level 6+7. We notice that at each educational level the number of children for stable couples has dropped 0.05-0.19, which is a considerably smaller figure than the overall difference of 0.38. This is another way of illustrating that a large part of the fertility decline is "explained" by higher level of education and another marriage pattern.

Furthermore, we will point out that fertility among the never married is much higher for those with low education than for those with a high education. This applies to the 1955 cohort as well as to the other cohorts.

At age 29 almost 40 per cent of the women with higher education are childless, as opposed to 13 per cent at the lowest educational level. Such differences also appear among stable couples. Their childlessness increases steadily from 6 per cent to about 20 per cent across educational levels, which probably to a large extent reflects a higher age at marriage.

7.3.4 Net effect of education on fertility

The effect of education according to simple mean value calculations is large, and the net effect as it appears in table 7.3 is also quite large compared to other cohorts: It is -0.07 children per level. If we include more covariates the education effect is reduced further (to -0.04 for women in stable unions according to table 7.7). We notice that for the 1955 cohort as well as for the 1945 cohort there is no reversal of the sign of the education effect, as we found when we analysed fertility at age 39.

7.4   Regional fertility differentials

7.4.1 Family formation and dissolution by region

The proportion never married differs from region to region. In the 1945 cohort the proportions ranged from 8 per cent in the rural areas of Sørlandet to 14 per cent in the rural areas of Nord-Norge. The increase from 1945 to 1955 was largest in Nord-Norge and smallest in Sørlandet, so that the maximum difference between the regions with respect to proportion never married has increased. About 15 per cent of the women in Sørlandet have never married and the corresponding proportion among those living in Nord-Norge is higher than 30 per cent (table 7.8). Trøndelag and Østlandet come next to Nord-Norge with proportions between 19 and 24.

The dissolution rates are also subject to a large regional variation. In the 1945 cohort the proportion of marriages that have been broken is 11 per cent in the non-rural areas of Østlandet and between 4 and 5 per cent in the rural areas of Vestlandet. These figures are 17 and 8 per cent, respectively, in the 1955 cohort. The ranking of the districts do not change much from 1945 to 1955, and the maximum dissolution rate is about twice the minimum rate in both cohorts.

Age at first birth and age at first marriage for the 1955 cohort are shown in table 7.9. Compared to the 1945 cohort there has been a marked change in Nord-Norge. The proportion who have married is much smaller than the proportion with at least one child. Actually, about 60 per cent of the ever married mothers in this region have had their first child the same year as the marriage or before. In Nord-Norge the proportion who are not married when they enter their thirties is particularly high. The proportion childless, however, is not higher than in other regions. Sørlandet is at the other end of the scale. In that region there is a relatively large proportion who have married when they are 25, while the proportion who have entered motherhood is not much higher than in other regions (except Østlandet). About 30 per cent of the women in Sørlandet have had their child prior to marriage or the same year as the marriage.

Teenage fertility is particularly high in Nord-Norge, where 39 per cent of those living in the rural areas have had a child when they are 20. At age 25, however, the proportion with a child is equally high in several other regions.

We also note that both in the 1955 and in the 1945 cohort the dissolution rates and the proportion never married are smaller in the rural than the non-rural districts. The difference in marriage propensity between rural and non-rural districts seems to be larger in the 1955 cohort than in the 1945 cohort.

Table 7.7. Regression models for number of children at age 29 among women living in stable unions. 1955 cohort.

	Number of women incl. 1798 child-less at age 29	Univariate models incl.1798 childless at age 29 effect estimate	Multivariate models incl.1798 childless at age 29 effect estimate	t-value	Multivariate models excl.1798 childless at age 29 effect estimate	t-value
Educational level [1]						
(linear)		-0.200	-0.043	(- 6.9)	-0.011	
Place of residence [1]						
Østlandet non-rural	6904	-0.28	-0.08	(- 4.2)	-0.05	
*Østlandet rural	1798	0.00	0.00		0.00	
Sørlandet non-rural	2023	0.03	0.06	(2.4)	0.12	
Sørlandet rural	673	0.29	0.17	(5.1)	0.22	
Vestlandet non-rural ...	2342	-0.06	0.05	(2.2)	0.07	
Vestlandet rural	1227	0.30	0.23	(8.6)	0.23	
Trøndelag non-rural	1253	-0.08	0.04	(1.5)	-0.01	
Trøndelag rural	507	0.20	0.18	(4.9)	0.10	
Nord-Norge non-rural ...	1384	-0.04	0.14	(5.1)	0.03	
Nord-Norge rural	641	0.18	0.19	(5.5)	0.08	
Age at marriage (linear) .		-0.153	-0.110	(-42.8)	-0.094	
Timing of first birth						
1+ year before marriage	1920				0.43	(25.3)
same year as marriage ..	4365				0.12	(10.5)
*1+ year after marriage .	10669				0.00	
Occupation [1]						
not employed	6517	0.53	0.37	(12.6)	0.27	
technical, scientific, juridical work	643	-0.31	-0.05	(- 1.2)	-0.04	
artistic, literary work	54	-0.71	-0.30	(- 2.9)	-0.14	
medical work	2837	-0.09	0.11	(3.5)	0.09	
pedagogical work	1050	-0.18	0.11	(2.7)	0.06	
administration	152	-0.39	-0.13	(- 1.9)	-0.08	
clerical work	2858	-0.18	-0.05	(- 1.5)	-0.01	
sales work, commerce....	1081	-0.07	-0.06	(- 1.8)	-0.04	
agriculture, fishing ...	326	0.58	0.30	(5.7)	0.26	
graphic work	49	-0.17	-0.12	(- 1.1)	-0.05	
*industry, craft (excl. graphic work)	696	0.00	0.00		0.00	
hotel, restaurant	891	-0.08	0.02	(0.6)	0.03	
house porter, charwork .	603	0.41	0.23	(5.7)	0.14	
other occupations	995	-0.05	0.04	(1.1)	0.04	

Table 7.7 cont.

	Number of women incl. 1798 child-less at age 29	Univariate model incl.1798 childless at age 29 effect estimate	Multivariate models incl.1798 childless at age 29		excl.1798 childless at age 29	
			effect estimate	t-value	effect estimate	t-value
Husband's education [1]						
unknown [3]	2933	-0.83	-0.03	(- 1.0)	-0.03	
low (2)	5478	0.17	-0.03	(- 1.8)	-0.03	
* medium (3-5)	8878	0.00	0.00		0.00	
high (6-7)	1463	-0.17	0.01	(0.6)	0.02	
Husband's occupation [1]						
not employed, unknown [3]	3399	-0.84	-0.16	(- 5.6)	-0.09	
technical, scientific, juridical work	1654	-0.24	-0.01	(- 0.3)	0.00	
artistic, literary work	134	-0.34	-0.08	(- 1.3)	-0.03	
medical work	347	-0.23	0.06	(1.3)	0.10	
pedagogical work	708	-0.19	0.00		0.00	
religious work	44	0.01	0.12	(1.0)	0.19	
administration	644	-0.18	-0.02	(- 0.5)	-0.02	
clerical work	755	-0.18	0.03	(1.1)	0.01	
sales work, commerce	1100	-0.12	-0.01	(- 0.3)	0.00	
agriculture, fishing	840	0.25	0.17	(5.7)	0.18	
transport	1664	-0.01	-0.01	(- 0.6)	-0.02	
wood work	977	0.08	0.03	(1.3)	0.05	
graphic work	163	-0.12	0.00		-0.02	
*industry, craft (excl. wood, graphic work)	5021	0.00	0.00		0.00	
hotel, restaurant	165	-0.18	-0.08	(- 1.3)	-0.05	
house porter, charwork	109	0.02	0.08	(1.1)	0.06	
other occupations	1028	-0.08	0.02	(0.8)	0.02	
Couple's religion [1]						
both members of						
* Norwegian Church	13326	0.00	0.00		0.00	
other rel. society	291	0.47	0.38	(8.7)	0.46	
none member of rel. soc.	437	-0.36	-0.13	(- 3.5)	-0.08	
restgroup [3]	4698	-0.60	-0.01	(- 0.4)	0.01	
Parents' education [4]						
unknown, not living with parents at age 5	32	-0.23	-0.12	(- 0.9)	-0.14	
*low education (2)	16170	0.00	0.00		0.00	
medium education (3-5)	1856	-0.15	0.02	(1.2)	0.04	
high education (6-7)	694	-0.40	0.01	(0.4)	0.06	
R² statistics for the model			0.33		0.29	

[1] when the women were 25 years old
[3] including women who had not yet married at age 25
[4] when the women were 5 years old

* Baseline group

Table 7.8 Relation between fertility at age 29, marital status at age 29 and place of residence at age 25. 1955 cohort.

Place of residence		Numbers	Per cent	Marital status	Per cent	Proportion childless (per cent)	Average number of children
Øst-landet	non-rural	10963	38.9		100.0	29.5	1.19
				never married	23.7	78.8	0.25
				stable unions	63.2	13.6	1.50
				break-up	13.2	17.0	1.39
Øst-landet	rural	2511	8.9		100.0	21.6	1.47
				never married	19.3	79.1	0.27
				stable unions	72.0	7.6	1.78
				break-up	8.7	10.1	1.60
Sør-landet	non-rural	2817	10.0		100.0	21.0	1.55
				never married	15.2	81.5	0.21
				stable unions	72.0	10.1	1.81
				break-up	12.9	10.2	1.70
Sør-landet	rural	856	3.0		100.0	17.7	1.79
				never married	13.7	79.5	0.26
				stable unions	78.6	6.5	2.07
				break-up	7.7	22.7	1.70
Vest-landet	non-rural	3421	12.1		100.0	24.7	1.40
				never married	21.0	76.6	0.27
				stable unions	68.7	10.8	1.72
				break-up	10.3	12.0	1.55
Vest-landet	rural	1580	5.6		100.0	15.4	1.80
				never married	15.1	72.7	0.34
				stable unions	77.9	5.4	2.08
				break-up	7.0	3.6	1.83
Trøn-delag	non-rural	1926	6.8		100.0	22.5	1.39
				never married	24.3	66.2	0.43
				stable unions	65.2	8.3	1.69
				break-up	10.5	10.3	1.67
Trøn-delag	rural	706	2.5		100.0	16.0	1.69
				never married	18.8	60.9	0.52
				stable unions	72.1	5.3	1.98
				break-up	9.1	7.8	1.81
Nord-Norge	non-rural	2384	8.5		100.0	22.6	1.39
				never married	31.0	51.1	0.66
				stable unions	58.4	9.5	1.74
				break-up	10.7	11.8	1.60
Nord-Norge	rural	1037	3.7		100.0	18.0	1.59
				never married	29.9	45.2	0.75
				stable unions	62.2	7.0	1.95
				break-up	7.9	2.4	1.94
Total		28201	100.0				

Table 7.9 Some family formation parameter, by place of residence. 1955 cohort

		Never married at age 29 [1]	Married			Child- less at age 29 [1]	First child at age		First child born		
Educa- tional level at age 25			age un- known [1]	age 16-20 [1]	age 16-25 [1]		16-20 [1]	16-25 [1]	year before marri- age or earlier [2]	same year [2]	year after marri- age or later [2]
Øst- landet	n-r	23.7	0.0	23.4	62.8	29.5	17.9	50.0	7.1	26.1	66.8
"	r	19.3	0.0	33.0	70.8	21.6	26.8	62.8	7.5	32.3	60.1
Sør- landet	n-r	15.2	0.0	37.4	75.2	21.0	24.9	63.4	6.1	23.4	70.4
. "	r	13.7	0.0	41.9	80.1	17.7	28.2	71.0	4.9	27.8	67.5
Vest- landet	n-r	21.0	0.0	27.4	66.9	24.7	22.8	57.8	10.4	29.1	60.5
"	r	15.1	0.0	37.3	76.9	15.4	31.8	72.4	10.8	31.2	58.0
Trøn- delag	n-r	24.3	0.0	24.9	64.0	22.5	25.0	59.5	18.8	28.5	52.7
"	r	18.8	0.0	33.7	70.2	16.0	35.3	71.3	23.3	29.0	47.7
Nord- Norge	n-r	31.0	0.0	20.0	56.4	22.6	27.8	62.5	35.5	22.2	42.7
"	r	29.9	0.0	24.6	60.6	18.8	39.0	71.0	39.5	22.8	37.5

[1] per cent of all women
[2] per cent of those of the women who have married before age 29 (and for whom
    we know the age at marriage) and have at least one child at that age

n-r = non-rural
  r = rural

The proportion who are married when they are 20 years old has increased in
Sørlandet and Vestlandet from the 1945 to the 1955 cohort, but there has been a
decrease in those regions - as well as all the other regions - if the fucus is
turned to age 25. The proportion with a first birth before they are 20 years old
has increased in all regions except Østlandet, but there has been a universal
decrease at age 25.

7.4.2 Average number of children by place of residence

In the 1945 cohort women living in the non-rural areas of Østlandet had 1.54
children when they were 29 years old, and those living in the rural areas   of
Nord-Norge had 2.21 children. The difference between this minimum and maximum
value is 0.67. The corresponding minimum and maximum for the 1955 cohort are
1.19 and 1.80, which makes a difference of 0.61. In the 1955 cohort the
cumulated fertility in the rural areas of Nord-Norge is 1.59, which is
considerably lower than in the rural areas of Vestlandet and Sørlandet (1.80 and

1.79, respectively). These two regions were very close to Nord-Norge in the 1945 cohort.

The drop in the average number of children has been smaller than 0.4 in Sørlandet and larger than 0.6 in the rural areas of Nord-Norge. Apparently, about half of this excess drop in fertility in Nord-Norge compared to Sørlandet is due to a larger increase in the proportion never married. This conclusion is reached on the basis of the following decomposition argument, which resembles the one we have presented several times earlier in the report: In the rural areas of Sørlandet fertility was 2.17 at age 29 in the 1945 cohort. The drop to 1.79 in 1955 can be considered as a two-step process. Firstly, the marital status specific fertility from 1945 is kept constant and we observe the effect of changing the distribution over marital status from that of the 1945 cohort to that of the 1955 cohort. This gives a drop equal to 0.19 (from 2.17 to 1.98). The second contribution is due to a change of the marital specific fertility, given the distribution over marital status observed for the 1955 cohort. This is 0.19. If the same calculations are made for the rural part of Nord-Norge, we get a first drop equal to 0.32 (from 1.91 to 1.59). Consequently, the excess drop in Nord-Norge is equally shared between a marital status component and a fertility component. (From a superficial inspection one would perhaps believe that the excess drop is almost exclusively due to a changing fertility, as fertility among stable couples drops 0.29 in Sørlandet and 0.53 in Nord-Norge. However, in a situation where only 70 per cent are married and there is a high and increasing fertility among the never married, a drop equal to 0.53 among the stable couples contributes only 0.32 on the aggregated fertility. A similar drop in the aggregated fertility in Sørlandet is 0.19. This does not differ so markedly from the change in fertility among stable couples in that region (0.29), which, of course, reflects that more women are married and extra-marital fertility is lower.)

For the stable couples the differences in fertility have almost the same magnitude as for the entire cohort. The minimum and maximum fertility is 1.73 and 2.48 in the 1945 cohort (difference 0.75), and 1.50 and 2.08 in the 1955 cohort (difference 0.58).

The fertility for the never married differs considerably from region to region. In the non-rural areas of Sørlandet in the 1955 cohort the never married - who represent 15 per cent of the population - have 0.21 children on the average, and 81.5 per cent are childless. In the rural areas of Nord-Norge the 29.9 per cent who have not married, have 0.75 children, and only 45.2 per cent are childless.

The proportion childless varies between 15 per cent and 29 per cent. The main difference is between rural and non-rural districts. In addition, Østlandet has particularly high figures.

7.4.3 Net effect of place of residence on fertility

In the previous section we pointed out that the difference between maximum and minimum fertility for the various regions was 0.61 for all women born 1955 and 0.58 for the stable couples. The regional variation estimated in multivariate models is much smaller, however. When age at marriage is included, the maximum difference is reduced from 0.58 to 0.43. Including education gives a

further reduction to 0.38 (see table 7.3). For stable couples there is a reduction from 0.57 to 0.31 when several variables are included, and when the childless are left out and first birth timing brought in as a covariate, the regional effect is only 0.28 (see table 7.7).

Such a large reduction of the regional effect was also observed for fertility at age 29 for the 1945 cohort, where the effect went down from 0.75 to 0.35. For fertility at age 39 in the 1945 and 1939 cohort the reduction was much smaller.

We also observe from table 7.7 that the ranking of Sørlandet and Vestlandet versus Nord-Norge with respect to cumulated fertility is markedly changed when the timing of first birth is included in the model.

7.5 Effect of other socioeconomic variables on fertility in the 1955 cohort

When we focus on the effects significantly different from 0, we find almost the same structure with respect to woman's occupation as in the 1945 cohort. There is only one difference: The small group of women in artistic or literary work have low fertility in the 1955 cohort, but not in the 1945 cohort.

Husband's occupation has a fairly small effect in the 1955 cohort as well as in the 1945 cohort. Only those working with agriculture have a fertility level differing significantly from that of the men in industry and craft. Medical work and wood work, which was associated with high fertility in the 1945 cohort, has a positive, but insignificant effect in the 1955 cohort.

Husband's and parents' education have no effect on cumulated fertility. Belonging to another religious society than the Norwegian Church gives a significantly positive contribution to fertility, as for the other cohorts.

8. A SUPPLEMENTARY STUDY OF REGIONAL FERTILITY DIFFERENTIALS

In the chapters 4-7 we have shown that there is a strong correlation between fertility and place of residence. This is true even in multivariate models where several explanatory factors are included. The objective of chapter 8 is to plunge somewhat deeper into the empirical relation between fertility and the regional dimension.

Our main emphasis will be on regional mobility. As we breifly referred to in chapter 6, there apparently is a correlation between migration and fertility for the 1945 cohort. This conclusion was based on our findings concerning the timing of first birth and place of residence at age 25 and age 35. A particularly interesting question, which we will try to answer, is whether there is an independent effect of the place of residence where the women have grown up. For instance, have women living in the central areas of Østlandet a larger family at age 39 if they have grown up in the rural areas of Vestlandet than if they have grown up in the rural areas of Østlandet?

In addition, we present a few results on the interplay between education and mobility, and we briefly assess the effects on fertility of educational level in the various regions.

We start with an inspection of fertility at age 39 and 29 for the 1945 cohort, using place of residence at age 15 and 25 as explanatory variables. We also present a discussion of the correlation between fertility at age 39 and mobility between age 25 and 35. Afterwards we explore the corresponding trends for the 1955 cohort.

8.1   Regional fertility differentials for the 1945 cohort

8.1.1 Regional mobility

The women in the 1945 cohort are grouped by region in table 8.1. We observe, for instance, that in the rural areas of Østlandet the number of inhabitants increase from 1960 to 1970, while the women tend to leave the rural areas of Vestlandet. 2808 of the women in our population live in the latter district when they are 15 years old, whereas only 1489 of them live there in 1970. The majority (1405) of the women living in the region in 1960 and living in another region in 1970 move to another municipality, but some (302) stay. The 302 women in the second group either live in an area which was classified as rural in 1960 and non-rural in 1970, or they move to a non-rural part of the municipality. In both cases they are registered in the table as in-migrants to a non-rural areas of Vestlandet. (The number 302 is also found in column 7 on the line for "Vestlandet non-rural".) To sum up, more than half of those living in the rural areas of Vestlandet at age 15 move out of that region within the next 10 years. Only 1101 of the 2808 remain. The majority (754) live in the same municipality, while a smaller proportion (347) move to another municipality in Vestlandet (and to a rural areas of that municipality). However, there is also an in-migration to the rural areas of Vestlandet from the non-rural areas of Vestlandet or from other main regions in Norway. The total number of in-migrants is 388. 341 of them lived in a different municipality in 1970, and 47 in the same municipality. The latter group consists of women who have moved from a non-rural to a rural areas

of the municipality, or who live in an area that is reclassified.

In general, table 8.1 shows that the non-rural areas of Norway increase their share of the 1945 cohort, while there is a decrease for the rural areas. The drop was particularly large in the rural areas of Nord-Norge, where the population in 1970 was only 42 per cent of the population in 1960. The out-migration from the less central districts among women in their teens and early twenties is probably closely related to education and job opportunities. As we show in a later section, women who have moved out of the region where they lived at age 15, have higher education than those who stay. Also those who move into the actual region have higher fertility, however.

Table 8.1   Number of women by place of residence 1960 and 1970. 1945 cohort

Place of residence	Lived in the region 1960 (1)	Lived in the region 1960, but not 1970		Lived in the region 1960 and 1970		Lived in the region 1970, but not 1960		Lived in the region 1970 (8)
		Lived in a different municipality (2)	Lived in the same municipality (3)	Lived in a different municipality (4)	Lived in the same municipality (5)	Lived in a different municipality (6)	Lived in the same municipality (7)	
Øst-landet n-r	7765	949	184	2358	4274	3971	579	11182
Øst-landet r	4543	2017	579	618	1329	725	184	2856
Sør-landet n-r	1811	525	56	305	925	790	200	2220
Sør-landet r	1308	624	200	158	326	216	56	756
Vest-landet n-r	2269	679	47	269	1274	1253	302	3098
Vest-landet r	2808	1405	302	347	754	341	47	1489
Trøn-delag n-r	1272	451	47	111	663	745	142	1661
Trøn-delag r	1505	726	142	210	427	151	47	835
Nord-Norge n-r	1384	548	43	231	562	923	262	1978
Nord-Norge r	2427	1336	262	215	614	145	43	1017

n-r = non-rural
  r = rural

A usual series of events is probably that the young women in the sparsely populated districts move away from home in their teens to take an education. Some return to the district where they have grown up, and some - perhaps those with the highest education - get a job in a more central part of the country, and are registered in another district at age 25 than at age 15.

Table 8.1 may be an acceptable basis for a more detailed discussion of regional mobility as a separate topic, but we consider that to be beyond the scope of this report. We will only remind the reader who wants a closer inspection of the table, that women who did not live in Norway in all the censuses 1960, 1970 and 1980 are left out of the population under study.

Table 8.2 Average number of children at age 29 by place of residence 1960 and 1970. 1945 cohort

Place of residence	Lived in the region 1960	Lived in the region 1960, but not 1970		Lived in the region 1960 and 1970		Lived in the region 1970, but not 1960		Lived in the region 1970
		Lived in a different municipality	Lived in the same municipality	Lived in a different municipality	Lived in the same municipality	Lived in a different municipality	Lived in the same municipality	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Øst-landet n-r	1.60	1.92	2.09	1.66	1.47	1.50	1.83	1.54
Øst-landet r	1.74	1.55	1.83	2.20	1.77	2.05	2.09	1.96
Sør-landet n-r	1.85	1.74	2.23	1.94	1.87	1.91	2.13	1.92
Sør-landet r	1.96	1.78	2.13	2.37	1.98	2.31	2.23	2.18
Vest-landet n-r	1.79	1.84	2.36	1.88	1.72	1.69	1.85	1.74
Vest-landet r	1.87	1.67	1.85	2.33	2.02	2.31	2.36	2.17
Trøn-delag n-r	1.84	1.79	2.23	1.93	1.84	1.74	1.92	1.81
Trøn-delag r	1.92	1.75	1.92	2.10	2.05	2.19	2.23	2.12
Nord-Norge n-r	1.85	1.74	2.23	1.96	1.88	1.90	2.24	1.94
Nord-Norge r	2.01	1.83	2.24	2.45	2.14	2.20	2.33	2.22

n-r = non-rural
 r = rural

8.1.2 Fertility and regional mobility

When we group the women in the 1945 cohort according to their place of residence at age 25 (i.e. 1970), the fertility at age 39 varies from 1.98 in the non-rural areas of Østlandet to 2.76 in the rural areas of Sørlandet (see table 8.3). The differences are smaller when we group by place of residence at age 15. This indicates that the place where the women have grown up is a less important determinant of fertility than the place where they live in their mid-20s, when they have usually started family-building. In the next paragraphs we try to gain a deeper insight into this issue by studying variations in fertility between women who stay in the region and women who move.

Women living in the rural areas of Østlandet at age 15 have 2.12 children at age 39, while those living there at age 25 have 2.30 children. An even larger increase is found for the other rural areas of Norway. The maximum increase 0.30 is observed for Vestlandet. In the non-rural districts the differences are smaller (0.02-0.11) between women living there at age 15 and those living there at age 25.

Let us now focus on column 2, column 5 and column 6 in table 8.3. This will give us an idea about fertility differentials at age 39 between women who move out of a district, women who stay in that district and women who move into the district. (These groups will occasionally be referred to as those staying in the district, "out-migrants" and "in-migrants".)

The difference between maximum and minimum fertility for those staying in the district is 0.76, while it is only 0.42 for the out-migrants. Among the out-migrants the fertility at age 29 (table 8.2) is particularly low in the rural areas of Østlandet and Vestlandet, and it is highest in the non-rural areas of Østlandet. Between age 29 and 39 out-migrants from Sørlandet or Vestlandet have about 0.6 children and all the other out-migrants have 0.45, so at age 39 the picture is slightly different: Out-migrants from the rural areas of Sørlandet and the non-rural areas of Vestlandet have the highest fertility, with out-migrants from the non-rural areas of Sørlandet and Østlandet not far behind. The level is particularly low for women from the rural areas of Østlandet. Among the other regions there is fairly little variation.

For women who lived in Sørlandet and Trøndelag at age 15 and subsequently moved out, we note that the fertility is almost the same for those who have moved from a non-rural district as for those who have moved from a rural district. In other words, it seems that the "memory of the regional background" is lost. We hesitate to take this as our final conlusion, however, as out-migrants from rural and non-rural districts tend to move to different areas. For instance, a larger proportion of the out-migrants from the non-rural districts move to the non-rural part of Østlandet, where fertility is low. On the other hand, those who move to a rural part of the same main region as they have left, have very large families. (These two empirical results are derived from table 8.4, which will be discussed in a later paragraph.) We also point out that the low fertility among out-migrants from the rural areas of Østlandet may not appear so surprising when we take into account that almost 90 per cent move to the non-rural areas of Østlandet.

Column 6 reveals that that some regions get a positive contribution to fertility from the in-migrants. The rural areas of the country, and in

particular the rural areas of Østlandet, Sørlandet and Vestlandet, apparently attract women who have or get a large family compared to women who have lived in those regions also when they were 15 years old.

Table 8.3 Average number of children at age 39 and total fertility between age 29 and 39 by place of residence 1960 and 1970. 1945 cohort

Place of residence	Lived in the region 1960 (1)	Lived in the region 1960, but not 1970		Lived in the region 1960 and 1970		Lived in the region 1970, but not 1960		Lived in the region 1970 (8)
		Lived in a diffe-rent muni-cipality (2)	Lived in the same munici-pality (3)	Lived in a diffe-rent muni-cipality (4)	Lived in the same munici-pality (5)	Lived in a diffe-rent muni-cipality (6)	Lived in the same munici-pality (7)	
Øst-landet n-r	2.01	2.36 [1] (0.44)[2]	2.32 (0.23)	2.08 (0.42)	1.89 (0.42)	2.00 (0.50)	2.10 (0.27)	1.98
Øst-landet r	2.12	2.01 (0.46)	2.10 (0.27)	2.50 (0.30)	2.13 (0.36)	2.46 (0.41)	2.32 (0.23)	2.30
Sør-landet n-r	2.37	2.38 (0.64)	2.64 (0.41)	2.44 (0.50)	2.33 (0.46)	2.42 (0.51)	2.56 (0.43)	2.40
Sør-landet r	2.56	2.43 (0.65)	2.56 (0.43)	3.01 (0.64)	2.61 (0.63)	2.81 (0.50)	2.64 (0.41)	2.76
Vest-landet n-r	2.30	2.43 (0.59)	2.68 (0.32)	2.27 (0.39)	2.23 (0.51)	2.28 (0.59)	2.32 (0.47)	2.26
Vest-landet r	2.42	2.24 (0.57)	2.32 (0.47)	2.89 (0.56)	2.56 (0.54)	2.90 (0.59)	2.68 (0.32)	2.72
Trøn-delag n-r	2.24	2.25 (0.46)	2.60 (0.37)	2.32 (0.39)	2.19 (0.35)	2.21 (0.57)	2.36 (0.44)	2.22
Trøn-delag r	2.36	2.19 (0.44)	2.36 (0.44)	2.57 (0.37)	2.53 (0.48)	2.64 (0.45)	2.60 (0.37)	2.56
Nord-Norge n-r	2.25	2.18 (0.44)	2.67 (0.44)	2.34 (0.38)	2.25 (0.37)	2.37 (0.47)	2.60 (0.36)	2.36
Nord-Norge r	2.46	2.28 (0.45)	2.60 (0.36)	2.86 (0.41)	2.65 (0.51)	2.69 (0.49)	2.67 (0.44)	2.70

[1] average number of children at age 39
[2] total fertility between age 29 and 39

n-r = non-rural
 r = rural

Tables 8.4 and 8.5 represent an alternative way of studying the relation between fertility and mobility. The information they provide fills some of the gaps that arise in a discussion based on tables 8.2 and 8.3.

Table 8.4 Number of women and average number of children[1]) at age 39 by place of recidence 1960 and 1970. 1945 cohort.

Place of residence 1960	Østlandet n-r	Østlandet r	Sørlandet n-r	Sørlandet r	Vestlandet n-r	Vestlandet r	Trøndelag n-r	Trøndelag r	Nord-Norge n-r	Nord-Norge r
					Place of residence 1970					
Øst-landet n-r	6632[2]) (1.96)[3]	648 (2.39)	99 (2.53)	29 (2.17)	116 (2.17)	30 (2.60)	88 (2.23)	12 (2.58)	87 (2.22)	24 (2.21)
Øst-landet r	2331 (2.00)	1947 (2.25)	44 (2.00)	16 (2.69)	65 (2.17)	31 (2.68)	36 (2.19)	16 (2.63)	47 (2.36)	10 (3.30)
Sør-landet n-r	247 (2.06)	15 (2.20)	1230 (2.35)	161 (2.90)	76 (2.32)	21 (2.71)	24 (2.42)	3	23 (2.17)	11 (3.81)
Sør-landet r	117 (2.18)	28 (3.14)	602 (2.48)	484 (2.74)	29 (2.31)	22 (2.86)	8	4	13 (2.54)	1
Vest-landet n-r	333 (2.13)	38 (2.60)	50 (2.32)	12 (2.83)	1543 (2.23)	199 (2.99)	46 (2.15)	9	26 (2.38)	13 (2.38)
Vest-landet r	364 (1.95)	51 (2.31)	97 (2.36)	35 (2.86)	1039 (2.33)	1101 (2.66)	60 (2.08)	15 (2.73)	38 (2.39)	8
Trøn-delag n-r	239 (2.09)	27 (2.11)	12 (2.50)	2	45 (2.18)	18 (2.72)	774 (2.21)	109 (2.61)	36 (2.39)	10 (2.60)
Trøn-delag r	180 (1.99)	33 (2.27)	15 (2.40)	3	39 (2.28)	22 (2.86)	512 (2.23)	637 (2.54)	55 (2.25)	9
Nord-Norge n-r	313 (1.98)	18 (2.89)	28 (2.43)	6	59 (2.30)	10 (3.20)	47 (2.28)	8	793 (2.28)	102 (2.68)
Nord-Norge r	426 (1.99)	51 (2.67)	43 (2.67)	8	87 (2.03)	35 (2.66)	66 (2.38)	22 (2.82)	860 (2.46)	829 (2.71)

[1]) not calculated for groups smaller than 10
[2]) number of women
[3]) average number of children at age 39

n-r = non-rural
  r = rural

When we focus on migration within a main region (squares along the diagonal), we find that the lowest fertility is among women living in the non-rural areas of the actual region both at age 15 and 25. Those who have lived in a rural district at age 15 and moved to a non-rural district between age 15 and 25, have somewhat higher fertility, and those who have lived in a rural

district at both ages have much higher fertility. These results are hardly surprising. They indicate that fertility is higher in the rural areas, and that those who move from rural to non-rural get a fertility intermediate to that of the women who have stayed in rural and that of the women who have stayed in non-rural districts, though closer to the latter than the former. Apparently, they are influenced by their background, but more influenced by their new place of residence.

Table 8.5 Average number of children[1]) at age 29 by place of residence 1960 and 1970. 1945 cohort

Place of residence 1960	Place of residence 1970									
	Østlandet		Sørlandet		Vestlandet		Trøndelag		Nord-Norge	
	n-r	r	n-r	r	n-r	r	n-r	r	n-r	r
Øst-landet n-r	1.54	2.05	2.02	1.79	1.66	2.07	1.69	2.08	1.75	1.75
Øst-landet r	1.59	1.91	1.68	2.06	1.58	2.16	1.47	2.06	1.81	2.60
Sør-landet n-r	1.43	1.47	1.89	2.41	1.46	1.95	1.92		1.61	2.91
Sør-landet r	1.41	2.46	1.97	2.11	1.41	1.91			1.38	
Vest-landet n-r	1.49	2.11	1.94	2.33	1.75	2.49	1.41		1.92	1.92
Vest-landet r	1.40	1.86	1.85	2.34	1.77	2.12	1.55	2.27	1.79	
Trøn-delag n-r	1.63	2.00	1.92		1.53	2.00	1.85	2.23	1.94	2.20
Trøn-delag r	1.46	1.73	1.87		1.85	2.41	1.84	2.10	1.82	
Nord-Norge n-r	1.53	2.61	2.07		1.71	2.50	1.77		1.90	2.27
Nord-Norge r	1.51	2.31	2.07		1.70	2.26	1.91	2.41	2.05	2.22

[1]) not calculated for groups smaller than 10

n-r = non-rural
 r = rural

The fourth figure in the square is more problematic to interpret. It indicates that women who move from a non-rural to a rural part of the main region, have higher fertility at age 29 as well as at age 39 than the women who lived in that district also at age 15. The difference is particularly large in Vestlandet. Having grown up in a non-rural district does not have the moderating effect that one would expect if the origin had been a very important determinant.

The in-migrants to the non-rural areas of Østlandet have slightly lower fertility at age 29 than the women who lived there also at age 15 (see table 8.5), but at age 39 they have slightly higher fertility. The differences are not large, however. Women who lived in the non-rural areas of Østlandet at age 25 and in the rural areas of Sørlandet have 2.18 children at age 39, and women who have moved from the rural areas of Vestlandet have 1.95 children. These are the extreme values among the women who have moved to the non-rural areas of Østlandet. Women living in the non-rural areas of Østlandet both at age 15 and 25 have 1.96 children.

Also for women living in the non-rural areas of Vestlandet, Trøndelag and Nord-Norge at age 25 we find small differences in fertility by place of residence at age 15. (This is seen when comparing along vertical lines in table 8.4.) In general, the in-migrants from Østlandet have lower fertility than the (average of) other in-migrants. Furthermore, in the majority of the districts there is a slightly higher fertility among in-migrants from rural than in-migrants from non-rural districts. The non-rural areas of Sørlandet are somewhat different from the other regions, as in-migrants from the rural areas of Østlandet (44 women) have much lower fertility than the other in-migrants to Sørlandet.

For the rural districts it is more difficult to assess the effect of place of residence at age 15, as there is very little in-migration except from the same main region, and consequently quite a large variance in the fertility estimates. A general pattern is that in-migrants from Østlandet have lower fertility than the other in-migrants. In Sørlandet and Vestlandet the highest fertility among in-migrants is found among women who have moved from a non-rural part of the same main region.

As a conclusion it seems that the migrants are influenced by the region in which they lived at age 15, but not to a very large extent. How are they affected by their residence at age 25? Let us, for instance, consider the women who lived in the rural areas of Vestlandet at age 15. Those who have moved to the non-rural areas of Østlandet, have the lowest fertility, but even among the others there is fairly large variation. (This is seen by comparing along horizontal lines in table 8.4.) Women moving to the rural areas of Østlandet have lower fertility than most of the other out-migrants, and the difference between rural and non-rural is 0.50 for Sørlandet and 0.65 for Trøndelag. In general, when we compare figures along horizontal lines, there are large differences between rural and non-rural, i.e. the women who move to rural districts have higher fertility than those who move to non-rural districts. A corresponding rural/non-rural difference was not that easily found with respect to place of residence at age 15 (comparing along vertical lines).

As population sizes are small it is difficult to compare for each region the fertility of out-migrants who move to the rural areas of Østlandet and out-migrants who move to the rural areas of, say, Vestlandet. However, we have grouped

together all out-migrants from Sørlandet, Trøndelag and Nord-Norge, and found that those who move to the rural areas of Østlandet get 2.56 children, and those who move to the rural areas of Vestlandet get 2.79 children.

Another method that could have been used to assess the independent effect of place of residence at age 15 conditioned on place of residence at age 25 - and vice versa - would be to estimate multivariate regression models and include place of residence at both ages as covariates. This has not been done in the present study.

Table 8.6 Number of women by place of residence 1970 and 1980. 1945 cohort

Place of residence	Lived in the region 1970	Lived in the region 1970, but not 1980		Lived in the region 1970 and 1980		Lived in the region 1980, but not 1970		Lived in the region 1980
		Lived in a different muni-cipality	Lived in the same munici-pality	Lived in a different muni-cipality	Lived in the same munici-pality	Lived in a different muni-cipality	Lived in the same munici-pality	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Øst-landet n-r	11182	1610	239	3148	6185	1166	499	10998
Øst-landet r	2856	521	499	171	1665	715	239	2790
Sør-landet n-r	2220	295	71	359	1495	546	131	2531
Sør-landet r	756	110	131	37	478	186	71	772
Vest-landet n-r	3098	721	100	327	1950	541	213	3031
Vest-landet r	1489	258	213	71	947	407	100	1525
Trøn-delag n-r	1661	393	56	170	1042	374	132	1718
Trøn-delag r	835	154	132	42	507	170	56	775
Nord-Norge n-r	1978	499	82	205	1192	423	141	1961
Nord-Norge r	1017	208	141	69	599	241	82	991

n-r = non-rural
r = rural

As a final part of our analysis of regional mobility in the 1945 cohort we have also studied the relation between the number of children and migration between age 25 and 35. In that period of life the migration flows are much smaller than in the teens and the early twenties (see table 8.6). Besides, the in- and out-migration tend to cancel each other, so that the number of women living in a particular region in 1970 is very close to the number living in the same region 10 years later.

Except for the non-rural areas of Østlandet the out-migrants have or get fewer children than the women who remain (see table 8.7). Also the in-migrants have usually low fertility, though higher than the out-migrants.

Table 8.7 Average number of children at age 39 by place of residence 1970 and 1980. 1945 cohort

Place of residence	Lived in the region 1970 (1)	Lived in the region 1970, but not 1980		Lived in the region 1970 and 1980		Lived in the region 1980, but not 1970		Lived in the region 1980 (8)
		Lived in a different municipality (2)	Lived in the same municipality (3)	Lived in a different municipality (4)	Lived in the same municipality (5)	Lived in a different municipality (6)	Lived in the same municipality (7)	
Øst-landet n-r	1.98	2.15	2.30	1.95	1.94	1.98	2.21	1.96
Øst-landet r	2.30	2.09	2.21	2.20	2.41	2.18	2.30	2.33
Sør-landet n-r	2.40	2.26	2.93	2.40	2.40	2.25	2.56	2.37
Sør-landet r	2.76	2.29	2.56	2.86	2.91	2.55	2.93	2.82
Vest-landet n-r	2.26	2.25	2.57	2.23	2.26	2.08	2.62	2.25
Vest-landet r	2.72	2.24	2.62	2.62	2.88	2.44	2.57	2.73
Trøn-delag n-r	2.22	2.19	2.23	2.19	2.24	2.18	2.43	2.24
Trøn-delag r	2.56	2.09	2.43	2.98	2.71	2.36	2.23	2.61
Nord-Norge n-r	2.36	2.32	2.61	2.33	2.37	2.17	2.60	2.34
Nord-Norge r	2.70	2.14	2.60	2.90	2.90	2.60	2.61	2.80

n-r = non-rural
  r = rural

When we compare fertility for women living in a region in 1970 and those living in the same region in 1980, we find very small differences. The largest difference is observed for the rural parts of Nord-Norge, and it is only 0.10.

8.2 Regional fertility differentials for the 1955 cohort

8.2.1 Regional mobility

Table 8.8 is similar to table 8.1, but refers to the 1955 cohort. The same trends are revealed as for women born 1945: the non-rural areas increase their share of the population, while there is a decrease for the rural areas.

Table 8.8   Number of women by place of residence 1970 and 1980. 1955 cohort

Place of residence	Lived in the region 1970	Lived in the region 1970, but not 1980		Lived in the region 1970 and 1980		Lived in the region 1980, but not 1970		Lived in the region 1980
		Lived in a different municipality	Lived in the same municipality	Lived in a different municipality	Lived in the same municipality	Lived in a different municipality	Lived in the same municipality	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Øst-landet n-r	8519	1068	222	2695	4534	3088	574	10891
Øst-landet r	3759	1596	574	407	1209	645	222	2483
Sør-landet n-r	2486	581	100	448	1357	789	202	2796
Sør-landet r	1235	527	202	149	357	243	100	849
Vest-landet n-r	2895	772	121	378	1624	1111	286	3399
Vest-landet r	2553	1186	286	294	787	370	121	1572
Trøn-delag n-r	1392	396	52	206	738	777	193	1914
Trøn-delag r	1338	648	193	113	384	151	52	700
Nord-Norge n-r	1973	614	83	307	969	851	233	2360
Nord-Norge r	1836	885	233	161	557	221	83	1022

n-r = non-rural
  r = rural

8.2.2 Fertility and regional mobility

The relation between fertility and mobility (see table 8.9 and 8.10) is almost equal to that was found for the 1945 cohort. We leave it to the reader to explore the tables in detail.

Table 8.9 Average number of children at age 29 by place of residence 1970 and 1980. 1955 cohort

Place of residence	Lived in the region 1970 (1)	Lived in the region 1970, but not 1980		Lived in the region 1970 and 1980		Lived in the region 1980, but not 1970		Lived in the region 1980 (8)
		Lived in a different municipality (2)	Lived in the same municipality (3)	Lived in a different municipality (4)	Lived in the same municipality (5)	Lived in a different municipality (6)	Lived in the same municipality (7)	
Øst-landet n-r	1.22	1.45	1.59	1.27	1.13	1.15	1.57	1.19
		1.48		1.18		1.21		
Øst-landet r	1.36	1.25	1.57	1.74	1.29	1.63	1.59	1.48
		1.33		1.40		1.62		
Sør-landet n-r	1.54	1.39	2.00	1.72	1.51	1.43	1.93	1.55
		1.48		1.56		1.53		
Sør-landet r	1.66	1.46	1.93	2.11	1.61	1.82	2.00	1.80
		1.59		1.75		1.87		
Vest-landet r-r	1.42	1.37	1.88	1.44	1.40	1.30	1.70	1.40
		1.44		1.41		1.38		
Vest-landet r	1.51	1.23	1.70	2.06	1.67	1.86	1.88	1.80
		1.32		1.77		1.86		
Trøn-delag n-r	1.41	1.38	1.67	1.52	1.38	1.34	1.47	1.39
		1.42		1.41		1.37		
Trøn-delag r	1.51	1.43	1.46	1.79	1.59	1.87	1.67	1.69
		1.44		1.63		1.82		
Nord-Norge n-r	1.39	1.28	2.01	1.40	1.39	1.32	1.67	1.40
		1.37		1.39		1.40		
Nord-Norge r	1.50	1.41	1.67	1.93	1.45	1.60	2.01	1.60
		1.46		1.55		1.71		

n-r = non-rural
  r = rural

Table 8.10 Number of women and average number of children[1]) at age 29 by place of residence 1970 and 1980. 1955 cohort

Place of residence 1970	Place of residence 1980									
	Østlandet n-r	Østlandet r	Sørlandet n-r	Sørlandet r	Vestlandet n-r	Vestlandet r	Trøndelag n-r	Trøndelag r	Nord-Norge n-r	Nord-Norge r
Øst-landet n-r	7229[2]) (1.18)[3]	681 (1.63)	136 (1.38)	18 (1.56)	125 (1.22)	27 (1.63)	105 (1.15)	20 (2.05)	138 (1.17)	40 (1.40)
Øst-landet r	1911 (1.34)	1616 (1.40)	47 (1.21)	15 (1.33)	45 (1.24)	25 (1.56)	33 (1.12)	13 (1.92)	39 (1.08)	15 (1.20)
Sør-landet n-r	246 (1.12)	16 (1.43)	1805 (1.56)	250 (1.95)	77 (1.23)	28 (1.61)	19 (1.42)	4	33 (0.97)	8
Sør-landet r	99 (0.97)	14 (2.21)	530 (1.70)	506 (1.75)	33 (1.27)	25 (2.24)	8	2	15 (0.93)	3
Vest-landet n-r	303 (0.99)	29 (1.62)	85 (1.34)	18 (1.67)	2002 (1.41)	328 (1.90)	54 (1.35)	9	53 (1.28)	14 (1.29)
Vest-landet r	265 (0.94)	32 (1.44)	85 (1.27)	20 (1.95)	956 (1.42)	1081 (1.77)	66 (1.27)	4	31 (1.03)	13 (1.23)
Trøn-delag n-r	177 (1.16)	17 (1.24)	27 (1.59)	1	32 (1.25)	15 (2.07)	944 (1.41)	133 (1.78)	34 (1.03)	12 (1.83)
Trøn-delag r	129 (1.25)	27 (1.81)	13 (1.38)	5	28 (1.36)	11 (1.73)	577 (1.45)	497 (1.63)	38 (1.50)	13 (1.85)
Nord-Norge n-r	312 (1.09)	17 (1.47)	45 (1.20)	5	53 (1.28)	13 (1.69)	61 (1.28)	5	1276 (1.39)	186 (1.84)
Nord-Norge r	220 (1.13)	34 (1.53)	23 (1.74)	11	48 (1.69)	19 (1.89)	47 (1.32)	13 (1.62)	703 (1.52)	718 ·(1.55)

[1]) not calculated for groups smaller than 10
[2]) number of women
[3]) average number of children at age 29

n-r = non-rural
  r = rural

8.3 Some relations between place of residence, education and fertility for the 1955 cohort

8.3.1 Regional mobility and education

The proportion with low education (level 2) and the proportion with high education (level 5, 6, 7) are shown in table 8.11 for different regions. We observe great differences in the educational level across regions. For instance, among women living in the non-rural districts in 1980 20-24 per cent had a high education and only 21-26 per cent a low education. In the rural areas of Nord-Norge only 13 per cent had a high education and 36 per cent a low education.

Women who have left the region where they lived when they were 15, have higher education than those who remain (compare columns 2 and 5). This applies to all regions and to rural as well as non-rural areas. In the rural areas of Vestlandet, for instance, 23 per cent of the women who move out of the region and to a different municipality have a higher education, compared to about 11 per cent among those who stay.

Furthermore, those who move from a non-rural to a rural part of the municipality, or vice versa, have very low education (column 3 and 7). The proportion who have reached level 5, is only 5-13 per cent.

We also point out that a large proportion of the in-migrants have high education and few have low, if we compare with the women who lived in the region in both 1970 and 1980 (column 6 versus column 5). This is most pronounced in Trøndelag and Nord-Norge and the rural areas of Vestlandet. Among the in-migrants to Nord-Norge 28 per cent have a higher education. Actually, their educational level is higher than it is among the out-migrants. This is the reverse of what we find for the other regions.

8.3.2 Relation between education and fertility in different regions

The main structure is that educational differences in fertility are almost equal in all regions. However, if we consider column 8 in table 8.12, and divide the fertility among women with low education by the fertility among those with high education, we find a slightly larger coefficient in Nord-Norge than in the rest of the country. This has also been found for the 1945 cohort (unpublished tables).

Table 8.11 Distribution over educational levels at age 25 by place of residence 1970 and
1980. 1955 cohort

Place of residence	Lived in the region 1970	Lived in the region 1970, but not 1980		Lived in the region 1970 and 1980		Lived in the region 1980, but not 1970		Lived in the region 1980
		Lived in a different municipality	Lived in the same municipality	Lived in a different municipality	Lived in the same municipality	Lived in a different municipality	Lived in the same municipality	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Øst-landet n-r	26.1,25.7 [1] [2]	20.5,34.2	34.5,10.8	23.2,28.1	28.6,23.1	21.5,26.2	43.6, 7.8	26.0,24.4
Øst-landet r	30.9,15.4	26.6,21.4	43.6, 7.8	31.5,12.3	30.2,12.2	27.3,16.9	36.5,10.8	30.2,13.3
Sør-landet n-r	26.6,22.8	17.6,37.7	36.0, 6.0	26.1,19.4	29.9,18.8	22.9,24.8	37.6, 7.9	27.9,19.8
Sør-landet r	30.4,15.5	24.9,23.3	37.6, 7.9	36.9, 6.7	31.6,11.8	30.9,14.4	36.0, 6.0	32.9,11.0
Vest-landet n-r	23.7,26.5	17.0,36.4	29.8,11.6	15.3,29.6	28.4,22.2	18.0,27.0	27.3,10.8	23.5,23.6
Vest-landet r	24.0,16.4	17.6,23.0	27.3,10.8	32.7, 9.9	29.1,10.9	29.7,21.1	29.8,11.6	30.0,13.2
Trøn-delag n-r	20.6,21.9	15.7,30.1	42.3, 9.6	21.4,22.3	21.4,18.3	19.2,27.2	25.9, 8.8	21.0,21.4
Trøn-delag r	23.2,15.4	20.8,20.1	25.9, 8.8	26.6,15.0	25.0 10.9	24.5,21.2	42.3, 9.6	26.4,13.7
Nord-Norge n-r	24.6,18.1	20.7,22.0	43.4,13.3	22.2,24.1	26.2 14.1	19.7,30.7	35.2, 5.2	24.2,20.5
Nord-Norge r	34.5, 9.9	30.1,12.8	35.2, 5.2	39.8, 9.9	39.9, 7.4	18.6,28.5	43.4,13.3	35.5,12.8

[1]) per cent with low education (level 2)
[2]) per cent with high education (level 5,6,7)

n-r = non-rural
r = rural

Table 8.12 Average number of children[1]) at age 29 among women with low or high education by place of residence 1970 and 1980. 1955 cohort

Place of residence	Lived in the region 1970 (1)	Lived in the region 1970, but not 1980		Lived in the region 1970 and 1980		Lived in the region 1980, but not 1970		Lived in the region 1980 (8)
		Lived in a different municipality (2)	Lived in the same municipality (3)	Lived in a different municipality (4)	Lived in the same municipality (5)	Lived in a different municipality (6)	Lived in the same municipality (7)	
Øst-landet n-r	[2]) [3]) 1.54,0.88	1.80,1.08	1.77,1.25	1.64,0.95	1.44,0.75	1.54,0.91	1.61,1.27	1.52,0.86
Øst-landet r	1.63,0.96	1.60,0.95	1.61,1.27	1.98,1.34	1.55,0.77	1.86,1.23	1.77,1.25	1.72,1.04
Sør-landet n-r	1.92,1.04	1.96,0.99	2.31,	2.01,1.44	1.85,0.92	1.75,1.12	1.94,	1.86,1.09
Sør-landet r	1.99,1.07	1.92,0.94	1.94,	2.36,	1.92,1.14	2.05,1.43	2.31,	2.09,1.34
Vest-landet n-r	1.84,0.97	1.85,1.01	2.36,	1.90,1.04	1.79,0.91	1.66,1.02	2.00,1.52	1.78,0.99
Vest-landet r	1.93,1.02	1.59,0.97	2.00,1.52	2.39,1.52	2.02,0.86	2.27,1.31	2.36,	2.18,1.13
Trøn-delag n-r	1.80,1.17	1.87,1.08	1.59,	1.86,1.04	1.78,0.97	1.68,1.09	1.90,	1.77,1.06
Trøn-delag r	1.87,1.17	1.76,1.18	1.90,	2.13,	1.93,0.95	2.32,1.38	1.59,	2.00,1.19
Nord-Norge n-r	1.80,0.97	1.74,1.00	2.25,	1.79,1.07	1.76,0.85	1.70,0.90	1.83,	1.76,0.91
Nord-Norge r	1.76,0.92	1.65,1.02	1.83	2.02,	1.81,0.54	2.02,1.14	2.25,	1.91,1.00

[1]) not calculated for groups smaller than 25
[2]) fertility among women with low education (level 2)
[3]) fertility among women with high education (level 5,6,7)

n-r = non-rural
 r = rural

9. SUMMARY AND DISCUSSION

9.1   Background

This is the first report from a project on reproductive behaviour in Norway. It is devoted to a description of fertility in three different female birth cohorts. Using a simple methodological framework we have studied some inter- and intracohort differentials which have received very little attention among Norwegian demographers or which have not been inspected since the Fertility Survey 1977.

A fairly unique data source is utilized. Individual biographies on childbirths and changes in marital status are extracted from the Central Population Register of Norway and linked to census information from 1960, 1970 and 1980. For our study we have selected three complete cohorts of female Norwegians (born in 1935, 1945 and 1955), and we examine variations in the total number of children born to those women. (Stillbirths are excluded, and children who are adopted are registred with their social mother.) The number of children is often referred to simply as fertility.

We hope that our report will essentially add to the existing knowledge of population trends in Norway. Moreover, it is meant to prepare the ground for future register-based fertility research and more advanced studies generated around the Family and Occupation Survey 1988.

9.2   Variation in fertility between the cohorts 1935, 1945 and 1955.

Marital status, educational level and place of residence are the three main explanatory variables in our analysis.

Informal cohabitation is becoming more and more prevalent in Norway as well as in several other countries, but, unfortunately, our data set only contains information on formal marital status. Thus, we have to study the timing of marriage rather than the point of entry into a consenual union, which is often equally interesting from a demographic life course perspective.

We have chosen educational attainment as an important variable, as school attendance is a time-consuming activity which to some extent competes with family activities. Moreover, educational level is a relevant indicator of opportunities in the labour market and individual resources in general. The educational level is described by a scale running from 2 to 7, where 2 is a primary education and 7 a higher education corresponding to a master's degree.

Our regional variable has ten categories: For each of the five main regions of Norway (Eastern Norway, Southern Norway, Western Norway, Middle Norway and Northern Norway) we distinguish between non-rural and rural districts (see figure 2.2).

The next sections 9.2.1-9.2.3 are devoted to a review of the empirical results concerning the decline in fertility. This intercohort variation in family size is discussed with reference to place of residence, educational level and marital status. In section 9.3 we focus on the intracohort fertility differentials. The importance of place of residence, education and marital status is discussed in more detail, and we also consider the effects of other determinants of fertility. The results presented in chapters 4-8 are summarized

and compared with those reported from other countries. We also advance a few proposals as to how our results should be interpreted and explained.

9.2.1 Reduction of completed fertility from the 1935 to the 1945 cohort

Women born in 1935 had on average 2.54 children by the time they were 39 years old, which of course is very close to the completed fertility of this cohort. As referred to in several other demographic reports (e.g., Brunborg, 1988), no other cohort of Norwegian women in this century have had more children than those born in the mid-1930s. In comparison, the average number of children by age 39 for women born in 1945 was 2.22 (see table 9.1).

Table 9.1 Some important figures for the cohorts 1935, 1945 and 1955

	1935 cohort age 39	1945 cohort age 39	1945 cohort age 29	1955 cohort age 29
Average number of children	2.54	2.22	1.77	1.39
Proportion never married (per cent) .	5.4	6.6	10.9	22.1
Average number of children among the never married	0.17	0.32	0.21	0.35
Proportion with only primary education four years earlier (per cent)	70.8	50.4	54.0	26.4

From the present study we may conclude that the decline in fertility from 2.54 to 2.22 during one decade is a result of a process that has taken place in all the social and regional groups that we have considered. Furthermore, it appears that this process has not primarily operated through a changing family formation and dissolution pattern. The proportion of marriages breaking up has increased considerably from one cohort to the other, but this explains only a very small part of the decline in fertility. Another small part is due to a slight increase in the proportion of never married, but in total these changes in the marital status pattern account for no more than about 10 per cent of the decline. Actually, the fertility decreased by 0.32 also for the women who lived in never broken unions at age 39, and the decrease was 0.37 for women who had experienced a break-up. On the other hand, the never married had almost doubled their fertility, from 0.17 in the 1935 cohort to 0.32 in the 1945 cohort (see table 9.1).

In all three cohorts that we have studied, the average number of children drops as the educational level of the mother increases (see more detailed discussion in section 9.3.5). Within the context of fertility decline the most essential result is that at all educational levels fertility has decreased considerably from the 1935 to the 1945 cohort (see table 9.2). Typically, the average number of children is reduced by 0.25 - 0.30, but for women with the highest educational level (level 6 + 7) the reduction is somewhat smaller, only 0.16. All these figures are lower than 0.32, which, of course, is consistent with the fact that women born in 1945 tend to have a higher education than those born 10 years earlier (table 9.1). An argument similar to the one presented previously for marital status indicates that the increased education "explains" 0.06 (20 per cent) of the decline from 2.54 to 2.22 (see section 5.3.1).

Table 9.2 **Average number of children for different cohorts and ages by educational level**

Educational level[1]	1935 cohort age 39 (A)	(A-B)	1945 cohort age 39 (B)	(B-C)	1945 cohort age 29 (C)	(C-D)	1955 cohort age 29 (D)
2 (7-9 years school attendance)	2.63	0.25	2.38	0.40	1.98	0.25	1.73
3 (10 years school attendance)	2.46	0.31	2.15	0.44	1.71	0.23	1.48
4 (11-12 years school attendance)	2.32	0.23	2.09	0.66	1.43	0.25	1.18
5 (13-14 years school attendance)	2.27	0.25	2.02	0.71	1.31	0.34	0.97
6 (15-16 years school attendance)	1.80		1.86		1.03		0.92
7 (17-18 years school attendance)	2.21		1.64		0.94		0.81
6 + 7	1.96	0.16	1.80	0.79	1.01	0.10	0.91

[1]) level at age 35 (column A and B) or age 25 (column C and D)

The general structure in the three cohorts is that our ten regions may be divided into three main groups with respect to fertility level: Fertility is lowest in the non-rural areas of Eastern Norway and highest in the rural areas of Southern, Western, Middle and Northern Norway. The exact ranking of the regions within these groups may differ from one cohort to the other. However, when we compare the 1935 and 1945 cohort, we have found that the decrease in the average number of children has been remarkably parallel in the different regions (see table 9.3). The 1945 figures are 86-90 per cent of the 1935 figures, with the exception of the non-rural districts of Northern Norway (84 per cent) and the rural districts of Southern Norway (92 per cent). The latter region, which was ranked as number 3 (from the top) in the 1935 cohort, after the non-rural areas of Western and Northern Norway, has taken the lead over Western Norway 10 years later, and has almost the same fertility as Northern Norway.

Table 9.3   Average number of children for different cohorts and ages by place of residence

Place of residence[1]	1935 cohort age 39 (A)	(A-B)	1945 cohort age 39 (B)	(B-C)	1945 cohort age 29 (C)	(C-D)	1955 cohort age 29 (D)
Eastern Norway n-r	2.20	0.24	1.96	0.42	1.54	0.35	1.19
Eastern Norway r	2.59	0.28	2.31	0.37	1.94	0.47	1.47
Southern Norway n-r	2.69	0.32	2.37	0.46	1.91	0.36	1.55
Southern Norway r	3.03	0.24	2.79	0.62	2.17	0.38	1.79
Western Norway n-r	2.59	0.35	2.24	0.51	1.73	0.33	1.40
Western Norway r	3.10	0.38	2.72	0.55	2.17	0.37	1.80
Middle Norway n-r	2.48	0.26	2.23	0.43	1.80	0.41	1.39
Middle Norway r	3.02	0.41	2.61	0.50	2.11	0.42	1.69
Northern Norway n-r	2.76	0.43	2.33	0.39	1.94	0.55	1.39
Northern Norway r	3.14	0.34	2.80	0.59	2.21	0.62	1.59

[1]) place of residence at age 35 (column A and B) or age 25 (column C and D)
n-r = non-rural
 r = rural

9.2.2   Reduction of fertility among young adults from the 1945
         to the 1955 cohort

The fertility that we have estimated for the 1935 and the 1945 cohort is
very close to the completed lifetime fertility for these cohorts. For the 1955
cohort, however, we are only able to study the average number of children at age
29. At this stage of life these women have only had 1.39 children, as opposed to
1.77 in the 1945 cohort (table 9.1). This means that with equal fertility
between ages 30 and 39 in the two cohorts, the women born in 1955 will end their
fertile period with about 1.85 children. In other words, they will not reach the
level required to reproduce themselves (about 2.1). If this happens to all
cohorts born after 1955, we will in a not so distant future experience a
negative natural growth of the Norwegian population.

It is, of course, possible that women born in the mid-1950s simply have
postponed their childbirths, and that they will enter their forties with as
large families as those born 10 years earlier. As we argue in a later paragraph,
there are reasons to believe that the 1955 cohort will have more children in
their thirties than the 1945 cohort. To catch up, however, they need 0.38
additional children. In the light of what we found for the 1945 cohort, this
seems to be a large figure. The fertility between age 29 and 39 for women in
that cohort with educational level 6 or 7, who were "late starters", was not
more than 0.5 higher than for women with only a primary education.

The decline found when we focused on the number of children at age 29 for
the 1945 and the 1955 cohorts contrasts in a very marked way with the decline
found when we compared the (almost) completed fertility for the 1935 and 1945
cohorts. The magnitude of the decline is almost equal - 0.38 and 0.32,
respectively - but the components are widely different.

The marriage pattern has a much greater influence when we compare the two
youngest cohorts. With constant marital-specific fertility the number of
children would have dropped by as much as 0.20 at age 29 as a result of a
changing marital status distribution only. This is more than 50 per cent of the
total decrease. The large effect of the marriage pattern is mainly due to a
doubling of the proportion never married at age 29. This proportion was 11
per cent in the 1945 cohort and 22 per cent in the 1955 cohort (table 9.1).
However, there has also been a considerable decline in fertility among the
currently or previously married: The average number of children has been reduced
by 0.27 for women who have experienced a break-up and by 0.34 for those who
have lived in stable unions. The opposite has happened for the growing group of
never married. Their fertility has increased from 0.21 to 0.35.

These changes in the marriage pattern and the rising fertility among the
never married are closely linked to the increasing prevalence of consensual
unions. Norwegian studies based on surveys suggest that informal unions in which
fertility is low to some extent have replaced the "going steady" period or the
initial years of the marriage (Brunborg 1979; Østby and Bull, 1986).

The decrease in the average number of children varies between 0.33 and 0.62
in the different regions (see table 9.3). It is less than 0.4 in Southern and
Western Norway and about 0.6 in Northern Norway. This has the effect that
fertility among 29 year old women in the 1955 cohort is highest in the rural
areas of Southern and Western Norway, while the rural areas of Northern Norway

has rank 4 among our 10 regions, with a fertility only slightly higher than the non-rural areas of Southern Norway. Apparently, about half of the excess drop in fertility in Northern Norway as compared to Southern Norway is related to the fact that the proportion never married has increased much more in Northern Norway.

The fertility decline has been 0.2 to 0.3 at all educational levels, except at the highest one (level 6+7), where it has only been 0.1 (see table 9.2). We found a similar development when we compared the cohorts 1935 and 1945, which indicates that the increasing group of women with high education are slowly catching up with the other groups.

At all educational levels the drop in fertility is less than 0.38, which is the overall decline. This is due to a changing distribution over the levels from the 1955 cohort to the 1945 cohort. More women have completed a secondary or higher education (table 9.1), which, in turn, is associated with a higher age at marriage, a higher proportion of never married at age 29, and a lower number of children at that age. A decomposition technique reveals that this drift towards higher educational level accounts for 0.14 (37 per cent) of the total fertility decline. We hesitate to refer to this as an "explanation of the fertility decline", as the decisions related to education do not necessarily influence subsequent fertility behaviour. In principle, we cannot - with the available data set- reject the idea that there is a reverse causality. An expectation of a small family may have the effect that schooling becomes a more attractive activity. Alternatively, decisions regarding education and family-building may both have been primarily influenced by the same individual background factors.

The general picture of the development over the last two decades is that the fertility decline has occurred in parallel in all regional and educational groups, and - as implied by later sections - in other sociodemographic groupings as well. The drop in fertility in the northern part of the country, where the average number of children has been high by Norwegian standards, has been somewhat larger than in the other regions. We have also found that the most highly educated women have experienced a fertility decline which is smaller than the national average. In spite of these two exceptions we are tempted to describe the fertility trends during the period under study as remarkably ubiquitous. We see no clear signs that a particular group has been an innovator in the process towards a shrinking family size, or that any particular group has greatly lagged behind the decrease in fertility. Furthermore, we have not been able to identify any groups which have had an increasing fertility.

It is interesting to note that a similar conclusion has been drawn in the United States. Sweet and Rindfuss (1983) have shown that from 1950 to 1980 "the national period fertility trends have occurred within every racial, social and economic subgroup examined". They also conclude that "standard socioeconomic variables operate to shift the entire trendline up or down, but do not explain the trend line". This is not in complete agreement with our results, as we have found that the increased educational level "explains" a fairly large part of the fertility decline during the last decade.

Focusing on women who were or had been married when they were 29 years old, we found that the average number of children was 1.96 in the 1945 cohort and 1.68 in the 1955 cohort. Among those who had been married for more than 10 years

(and, consequently, married in their teens), fertility was more than 0.4 higher in the 1945 than in the 1955 cohort (see table 9.4). At marriage durations of 6-9 years the differences between the two cohorts were 0.2-0.4, and at shorter durations there were hardly any differences. The fact that the drop has been particularly marked among women who have been married for several years, is consistent with previous works showing that the reduction of fertility is mainly due to fewer transitions to parity three (Brunborg and Kravdal, 1986), as these transitions often occur at longer marital durations. When fertility at very short durations has remained almost constant, it probably reflects the strong link between marriage and first birth as initial events in the family-building process. People have often married, and still do, when they want to have children, have recently had a child or are pregnant. In other words, our results show that the <u>correlation between age at marriage and number of children at age 29 has become weaker</u>. A similar result appeared when we compared the 1935 and the 1945 cohort at age 39.

Table 9.4   Average number of children at age 29 or 39 for different cohorts, by age at marriage[1])

Age at marriage	1935 cohort age 39 (A)	(A-B)	1945 cohort age 39 (B)	(B-C)	1945 cohort age 29 (C)	(C-D)	1955 cohort age 29 (D)
16	3.19	0.03	3.16	0.20	2.96	0.75	2.21
17	3.33	0.23	3.10	0.19,	2.91	0.63	2.28
18	3.31	0.40	2.91	0.18	2.73	0.54	2.19
19	3.17	0.43	2.74	0.20	2.54	0.44	2.10
20	3.04	0.44	2.60	0.25	2.35	0.37	1.98
21	2.84	0.43	2.41	0.30	2.11	0.25	1.86
22	2.75	0.39	2.36	0.38	1.98	0.28	1.70
23	2.69	0.46	2.23	0.46	1.77	0.18	1.59
24	2.58	0.38	2.20	0.62	1.58	0.15	1.43
25	2.48	0.37	2.11	0.75	1.36	0.08	1.28
26	2.44	0.43	2.01	0.85	1.16	0.02	1.14
27	2.38	0.36	2.02	1.07	0.95	0.01	0.94
28	2.27	0.43	1.84	1.12	0.72	-0.10	0.82
29	2.17	0.27	1.90	1.50	0.40	-0.05	0.45
30	1.99	0.29	1.70				
31	1.87	0.13	1.74				
32	1.80	0.22	1.58				
33	1.66	0.24	1.42				
34	1.54	0.23	1.31				
35	1.19	0.08	1.11				
36	1.08	0.18	0.90				
37	0.66	-0.17	0.83				
38	0.38	-0.34	0.72				
39	0.80	0.52	0.28				

[1]) including women who have experienced a marital dissolution

The drop in the number of children at age 29 for married women (when we compare cohorts 1945 and 1955) is partly due to a lower fertility among those marrying before age 25 - and in particular among teenage brides - but also due to a changing age at marriage. Truly, we have found that among the (decreasing) group of married women at age 29 an increasing proportion have entered marriage in their teens. On the other hand, however, more women have waited until they have passed 25 to marry.

9.2.3 Fertility between ages 29 and 39

An important, but unfortunately very difficult, question is whether women born in 1955 will compensate for their late start in childbearing as they enter their thirties. We cannot, of course, provide an indisputable answer to this, but we believe that our study of the behaviour of the 1945 cohort may be of some relevance.

As stated earlier, we have found the most outstanding examples of compensation among women with the highest educational level (level 6+7). Their fertility between age 29 and 39 was 0.5 higher than it was for women with no more than a primary education. This effort did not quite close the gap, however, as the highly educated women were about 1 child behind at age 29.

Women born in 1945 gave birth to 0.45 children during their thirties. This figure increased from about 0.4 to about 0.9 across educational levels. If we assume the same education-specific fertility figures at ages 29-39 for the 1955 cohort as for the 1945 cohort, and a distribution over educational levels equal to the one observed for the 1955 cohort, they would have a fertility of 0.51 during the thirties, which is 0.06 higher than for the 1945 cohort. Thus, it does not seem unlikely that the 1955 cohort eventually may have more than 1.9 children.

We strongly emphasize, however, that a figure like 0.9 for the fertility between ages 29 and 39 for the most highly educated women should not be interpreted as an upper limit. The women born in 1955 may, of course, well exceed this figure. Many of them may have been accustomed to living as childless adults and thus experience some psychological barriers with respect to family-building, but the biological constraints should not impede figures considerably higher than 1. On the other hand, we cannot rule out the possibility of an even lower fertility than 0.9.

From a regional perspective there is no compensation at a later stage for low fertility recorded at age 29. This is probably because low fertility is not due to a late marriage to the same extent as for highly educated women. Actually, the regional differences tend to widen after age 30, so that they are larger at age 39 than at age 29. For instance, in the non-rural areas of Eastern Norway the fertility between age 29 and 39 was only about 0.4, as opposed to 0.5 in the rural areas of Northern Norway and 0.6 in the rural areas of Southern Norway.

9.3 SOCIODEMOGRAPHIC DETERMINANTS OF FERTILITY IN THE COHORTS 1935, 1945 AND 1955

In this report we have estimated variations in the number of children according to several individual characteristics. The effects on fertility of marital

status, age at marriage, place of residence and educational level have been briefly reviewed in section 9.2. In the subsequent sections these relations will be discussed in more detail.

As stated previously, a fairly large part of the fertility development across cohorts is left unexplained when standard sociodemographic factors are considered. We have also seen that this is true from an intracohort perspective. Regression models of number of children with marital status, age at marriage, place of residence and education included have R^2-values of about $0.2 - 0.3$. Even when additional factors, such as occupation, are included the R^2-values do not exceed 0.4. In other words, we can not account for all the heterogeneity in the data material, which, of course, is hardly surprising, as human reproductive behaviour is of a very complex nature. Our ambition in the following sections is merely to throw some further light on a few important determinants of fertility.

9.3.1 Similar effects on fertility in all cohorts

In general the correlation between number of children and the different covariates that we have considered varies very little across the cohorts. This has already been shown for education and place of residence. However, there are examples of covariates which have less influence on fertility in one cohort than in another.

9.3.2 Which variables are most important?

Several of the variables we have studied appear to be important determinants of fertility. If we consider the family size at age 39 among women who were born in 1945 and who have been living in stable unions, we find that place of residence, the woman's occupation and religious denomination all have an effect greater than 0.5 children. (That is, the maximum fertility difference between the categories, which of course depends heavily on our division into categories, is more than 0.5.) Marital break-up and the educational levels of the woman, her husband and her parents affect fertility by 0.2 children or less. We also point out that the difference in fertility between women who marry when they are, say, 20 years, and those who marry when they are 28, is greater than any other difference we have found between the levels of one single covariate.

For the fertility at age 29 of the 1955 cohort place of residence is only of medium importance. Also marital break-up, which was a rather weak determinant at age 39 for the 1945 cohort, is among the variables of medium importance.

9.3.3 The effect of marital status, age at marriage and timing of first birth relative to marriage

In the sociological tradition of fertility research marital status and age at marriage are often referred to as intermediate variables, through which the effects of normative, cultural and economic factors operate (Davis and Blake, 1956; Freedman, 1975). Three groups of intermediate variables are mentioned: those related to exposure to intercourse, those related to exposure to conception, and those related to outcome of pregnancy. Marital status and age at marriage are in the first of these groups.

Our work has confirmed the importance of marital status and age at marriage, and the results suggest that the longer the woman has lived in a marital union, the higher is her number of children.

As expected, the never married have very few children. Their fertility is increasing, however, in parallel with the emergence of cohabitation without marriage as an important new life-style. Furthermore, we have found that a marital break-up has a negative effect on the number of children, which was not obvious from the outset, as one might have expected a compensation in a second union for "lost" childbirths. Our results contradict previous studies from Norway based on the Fertility Survey 1977 (Kristiansen, 1984), in which it was argued that marriage dissolution had no effect on fertility. It should be emphasized, however, that according to our models, marital stability is not an important determinant of fertility. A break-up reduces the number of children by 0.2-0.4. It is also evident that the increasing instability of marital unions since 1965 explains only a minor part of the fertility decline during that period.

For the women who have experienced a break-up, we have shown that the number of years in marriage is positively related to fertility. This is a net effect with age at marriage controlled for.

Another important result is that age at marriage has a substantial impact on fertility. We have found that increasing the age at marriage by about 8 years reduces the number of children at age 39 by 1. These figures agree very well with results from the Norwegian Fertility Survey 1977 (Noack and Østby, 1981). Furthermore, we have found that the impact of age at marriage is weakening across cohorts.

The importance of age at marriage is, of course, well documented in several other countries (see e.g., Rindfuss and Sweet, 1978), as is also the effect of age at first birth (see e.g., Bumpass et al., 1978). The latter investigators have also found that premarital births have a positive effect on subsequent fertility. Our own data suggest the same conclusion. Women who already have a child when they enter marriage have more children by age 29 or 39 than other women with the same sociodemographic characteristics. The differences that we have found are 0.5 - 0.7 children, and are slightly decreasing across cohorts.

The high fertility among women with a premarital childbirth may be a manifestation of the importance of exposure time. When the other variables are fixed, those who have had their first child before marriage, have been under exposure for additional childbirths for a longer time. In the light of this it is interesting to note that a premarital childbirth has an effect corresponding to an age at marriage that is more than 4 years lower. This might indicate that other explanations are also important. In particular, we point out that there may be individual characteristics that are correlated with a premarital, and often unplanned, first birth as well as with a higher fertility during the life course. For instance, contraceptive use might be less efficient. If this is a reasonable explanation, it is not surprising that the influence of having a child before marriage decreases slightly with increasing prevalence of premarital childbirths. The group of women with a premarital childbirth may have become less selective with respect to different individual characteristics, which could have the effect that fertility deviates less from the average.

We also hesitate to consider the effect of age at marriage exclusively as an

effect of exposure time. It seems reasonable to assume that a low age at marriage also goes along with individual characteristics that are correlated with subsequent fertility.

As the final point of this section, we emphasize that <u>age at marriage, premarital births, marital dissolution and number of years in marriage have a larger effect on the number of children at age 29 than at age 39</u>. This has two main interpretations: Firstly, additional fertility tends to decrease with marital duration, so that a year outside marriage has a larger effect the earlier the break happens. Secondly, there may be a compensation, so that women with a late marriage or first birth or an early break-up make up for their "lost childbirths" later in life.

9.3.4 Regional fertility differentials

There are substantial regional fertility differentials in Norway. This is well known from the published total period fertility rates by county (see e.g., Central Bureau of Statistics, 1987) and the census data on number of children among currently married women (Dyrvik, 1976; Central Bureau of Statistics, 1988). Berge (1974) has defined 77 regions, and estimated their fertility level on the basis of data from the Central Population Register. The results are briefly discussed in the light of economic and cultural factors. His results demonstrate that there are large differences in family size between the various parts of the country and between urban and rural districts. The latter relation is confirmed by Jensen (1981) in an analysis of the Fertility Survey 1977.

With respect to the average number of children for real female birth cohorts the only work that has previously been carried out in Norway is by Noack and Østby (1981) in their comprehensive analysis of the Fertility Survey. They estimated the number of children by place of residence in which the women had grown up, and found a difference of about 0.5 between Eastern Norway and the three regions Southern, Western and Northern Norway. Furthermore, their work confirmed Berge's result that age at first birth is higher in Southern and Western Norway than in Middle and Northern Norway, but the total number of children at the end of the fertile period is nevertheless approximately the same in these four regions.

Our data source, which comprises a very large number of individuals, allows us to consider fairly small regions, but we have not given this priority. Instead we have selected the five main regions in Norway (Eastern Norway, Southern Norway, Western Norway, Middle Norway and Northern Norway) as units of analysis, and have divided each of these regions into rural and non-rural areas.

As referred to in section 9.2, the general structure for the three cohorts is such that the ten regions may be divided into three groups with respect to fertility level: <u>The average number of children is lowest in the non-rural areas of Eastern Norway, and highest in the rural areas of Southern, Western, Middle and Northern Norway</u>. The exact ranking of the regions within these three groups may differ somewhat from one cohort to the other, however. For instance, the rural areas of Northern Norway had the highest fertility level in the 1945 cohort, but somewhat lower than the rural areas of Southern, Western and Middle Norway in the 1955 cohort (1.59 as opposed to 1.69-1.80). The details of the

regional pattern are displayed in table 9.3.

According to simple mean value calculations of fertility by place of residence, the regional variable has in an absolute, but not in a relative sense, lost some of its importance over the cohorts (table 9.2). Even for the 1955 cohort, however, there is a difference as large as 0.6 between the non-rural areas of Eastern Norway and the rural areas of Southern and Western Norway. This is with respect to the number of children at age 29, and we found for the 1945 cohort that the differences widen with increasing age.

When other factors are included as controls, the effect of the regional variable is reduced, particularly when we focus on fertility by age 29. For instance, when age at marriage is included, the difference between maximum and minimum fertility for the regions is reduced from 0.6 to 0.4 for the 1955 cohort. Introducing timing of first birth and socioeconomic variables gives a difference close to 0.3, which is a fairly small effect compared to some other variables. The corresponding net effect of place of residence on fertility at age 39 for the 1935 cohort is higher than 0.8.

In the calculations referred above we have focused on the place of residence four years before the age at which we have estimated the number of children. However, we have also examined the effect of place of residence at age 15 on fertility. It is evident that the place where the women have grown up is a weaker determinant of fertility than the place where they live in their mid-20s. A large proportion of women who lived in rural districts at age 15 had moved out before age 25. We have found that these out-migrants have fewer children than those who stay in the region. On the other hand, there is an in-migration to rural districts of couples who have or are going to have many children. In particular, we have found that women who have moved from a non-rural to a rural part of the same main region, have higher fertility than those who lived in the rural areas also at age 15.

As one might expect, there appears to be a relation between migration and educational activities. Those who move out of a region between age 15 and 25, have a higher educational level (and a lower fertility) than those who remain. More surprising is perhaps the result that the in-migrants to rural areas, who have fairly high fertility, also have a high educational level.

With respect to fertility the out-migrants seem to be only weakly influenced by the region they have left. If we consider all women living in a particular region at age 25 and who did not live there at age 15, those who left a rural district have only slightly higher fertility than those who have left a non-rural district. Furthermore, it seems that women from Eastern Norway have fewer children than women from other regions, but this is also a very weak effect. In marked contrast we find that among the out-migrants from a particular region, those who move to a rural region have a substantially higher fertility than those who move to a non-rural region.

Studies of the interplay between migration and fertility have also been reported from other countries. For instance, Ritchey and Stokes (1972) have found that the number of children is only slightly higher among women who have moved from a rural to an urban districts than among women who have lived in that urban district for a long time. This corresponds well with our own results that the destination has more influence than the origin. Furthermore, they conclude that the migration itself exerts a negative influence.

We also refer to an analysis of Norwegian data by Brunborg (1984), in which the number of children among women at different ages is the dependent variable in regression models where both the region in which the women have grown up and the region in which they reside at time of interview are included. The estimates clearly indicate that current region has more explanatory power than the region of origin.

In a work by Kiser et al. (1968), however, there is no evidence that region of origin has a consistently stronger or weaker effect than region of destination.

Our analysis of the relation between fertility and migration is very simple, as it was never meant to constitute more than a minor part of our work. Future research on this topic in Norway should be much more elaborate. The data situation gives an opportunity for detailed studies, perhaps along lines similar to those suggested by Hoem (1975).

It is not easy to pin the fairly large regional differences that we have found to one particular explanation. For instance, differences in values may play a role, though we emphasize that values acquired during adolescence may have a very limited influence, as it appears that there is not much "memory of the regional background" once people move. They are, however, strongly influenced by the place to which they move.

A factor that probably contributes considerably to the regional differentials is that it is easier for a large family to obtain a good housing standard in a rural than in a non-rural district. A second explanation is that many parents may believe that for several reasons it is better for a child to grow up a in a less populated area. In addition we point out that people living in a city may be more likely to be attracted to activities that compete with raising a child - both in their leisure time as well as through improved possibilities for full time and long-lasting employment.

9.3.5 The woman's education as a determinant of fertility

Several investigators have examined the association between education and family-building. In advanced societies as well as in developing countries it is usually found that higher education tends to depress fertility (see e.g. Sweet and Rindfuss, 1983), although an increase in fertility when the educational level exceeds a certain limit has also been reported (Andorka, 1978).

In Norway much attention has already been devoted to studies of variation in fertility by educational attainment. The results from the Fertility Survey 1977 demonstrate that the median age at first birth for women who have only primary education (less than 9 years school attendance) is 5 years lower than for women with more than 12 years school attendance (Noack and Østby, 1981) The differences in the number of children are fairly large during the early stages of adulthood, but the women with the highest education partly compensate for their late start in the later years. Nevertheless, it was found that women with more than 10 years school attendance had about 0.5 fewer children when they entered their forties than other women (see also Jensen, 1981; Brunborg, 1984). No difference was observed between women with 10-12 years of schooling and those who had more than 13 years. Surprisingly, there is no clear effect of

educational level in the studies of marital fertility reported by Dyrvik (1976) and Central Bureau of Statistics (1988).

Jensen (1981) has found that educational level has a small negative effect when age at marriage and some other variables are controlled. In these models the number of children is estimated for women aged 18-44 years.

In the present report education is found to be very important in the univariate fertility models. The average number of children decreases steadily with increasing educational level. For instance, for the 1945 cohort the number of children at age 39 was 2.38 for the women with the lowest education (called level 2 on a scale from 2 to 7) and 1.64 for those with the highest education (level 7). It is not unlikely that this gap will become smaller during the forties, but we believe that fertility at such a high age only creates a minor perturbation of the pattern observed at age 39.

Much of the difference in fertility between the educational levels is due to the proportion of women never married. In the 1945 cohort 5 per cent of the women with the lowest education had never married by the time they reached forty, while this proportion was 18 per cent at the highest educational level. Moreover, it appears that among those who have married, education has only a small independent effect on fertility when age at marriage is brought in as a control variable. Women with high education tend to enter marriage later than those with low education, and that explains to a large extent their low fertility. At a fixed age at marriage the effect of education seems to be largest when we focus on the number of children at age 29. Then the fertility is reduced by 0.02 - 0.07 per educational level (on the scale form 2 to 7), depending on the cohort studied and the model specification. The estimated effects of education are generally smaller for the 1945 cohort than for the 1955 cohort. For the 1945 cohort education has no net effect at age 39, while we have found a significant positive effect for the 1935 cohort.

It is not hard to find reasonable explanations for the educational differences in fertility. A postponement of first birth and first marriage among women with high education may be partly due to the time it takes to finish an education. Probably even more important is the indirect effect that education has: A woman's investment in education makes her more attracted to the labour market, gives her chances of earning a higher wage, and consequently tends to increase the opportunity costs of childbearing and childcare. In light of this it does not seem unreasonable that highly educated women have fewer children altogether and that they start building up their family at an older age. They may want to become well established in the labour market and exploit their investment in education before they come under the pressure of family obligations. It is perhaps more unexpected that once the age at marriage is controlled, the effects of educational differences do not materialize very clearly. Moreover, it is hard to find any evident explanation why the net effect of education was positive for the 1935 cohort and progressively more negative over the cohorts.

It has also been argued that the low fertility among the most educated women is partly caused by a better knowledge or better use of contraception (Michael, 1973). Results from the Fertility Survey 1977 indicate that this also may be the case in Norway (Brunborg, 1984).

Another interesting result that we have obtained in our studies of education and fertility is that when we compare women on the same educational level at age 35, those who have taken their education at a fairly high age have terminated their fertile period with fewer children than those who have reached the same level earlier. We were somewhat surprised to find that the women who take their education late, have had an earlier first birth than the others, and have more often had a premarital birth as well. An early first birth is usually associated with a particularly high fertility rather than a low one as in this case. The result might indicate that the women have had their educational careers disrupted by a childbirth, and that the combination of childcare and educational activities makes subsequent childbirths less attractive than it is when education and childbearing are more separated activities along the life course. In order to test the relevance of this interpretation complete educational histories would have been a great advantage.

It also appears that more women are divorced among those reaching their final educational level at an older age. However, the differences in fertility are only to a very small extent explained by differences in marital stability.

We also point out that a rather superficial inspection of regional variations indicates that education has more or less the same effect in all regions. Cho et al. (1971) have found that improvement of the general educational level tends to blur the differences in fertility between women of different levels. Since we did not find such a blurring in our intercohort studies, however, it seems quite reasonable that educational fertility differences are almost equal in the various regions for a given birth cohort.

9.3.6 Effect of the education of the husband and of the woman's parents.

In univariate models fertility tends to decline with the increasing level of education for the husband or the parents. The influence of these factors seems to work through the woman's own education and age at marriage, however. When several factors are included in the models, parents' education and husband's education have only very small effects on fertility. Only at age 39 for the 1945 cohort have we found effects significantly different from 0. These effects were positive.

Our results with respect to husband's education agree with earlier Norwegian studies. Jensen (1981) found that husband's education is inversely related to fertility in univariate models, while there is no effect when woman's education and several other variables are controlled. In some American studies an independent effect is observed for husband's education. The interaction between husband's and woman's education may also be important. For women with low education there is a negative relation between fertility and husband's education, whereas the relation is positive among women who have a higher education (Kiser et al., 1968; Rindfuss and Sweet, 1978). In other words, differences in education between the spouses tend to depress fertility (see also Cho et al., 1971). Unfortunately, we have not studied this interaction in our own work.

One would perhaps assume that an increased educational level for the husband is associated with higher fertility, as high education often goes along with high income, and income is sometimes reported to be positively related to

fertility in contemporary industrialized societies (see e.g., Cho et al., 1971). This issue will be discussed in section 9.3.8. At present it suffices to state that we have found no effect of (current) income in our own analysis.

The fact that we have found an effect of parents' education in univariate models is far from surprising. It has been reported previously that in Norway this variable has an effect both on total number of children and on age at first birth - though the relation is weaker than that observed when the focus is on the woman's own education (Noack and Østby, 1981). Jensen (1981) has estimated multivariate regression models, however, and has observed that there is no net effect of parents' education when other variables are included.

Our result with respect to parents' education and the small importance of place of residence at which the woman has grown up, may be taken as support for the notion that experiences from early stages of the life cycle have a very limited direct influence on fertility.

9.3.7 Fertility and religious affiliation

Unfortunately, our data set does not provide adequate information on religious affiliation. Only three groups are defined in the population censuses: A large majority are members of the Norwegian Church, a small group are members of another religious denomination, and still another small group are not members of any religious denomination. No distinction is made between Catholics, Methodists, Pentecostals, etc.

It is interesting to note that affiliation to a religious denomination other than the Norwegian Church is associated with a fertility 0.2 - 0.6 higher than the average. This relation appeared in all the three cohorts of our study. We are inclined to believe that this is a religiously active group with a somewhat different ideological platform than others. It is possible that we would have found a high fertility also among religiously active within the Norwegian Church, but with our data we are unable to split these individuals from the large group of "passive" members. In Brunborg's (1984) analysis based on data from the Norwegian Fertility Survey 1977 it was concluded that there is a significant positive relation between fertility and religious activity, as measured by the number of religious meetings the respondent has attended per year.

9.3.8 Income and fertility

Much attention has been devoted to studies of the association between income and fertility, not least because income is a factor that can be influenced by political decisions.

Traditionally, an inverse relationship between fertility and husband's income or family income has been found - at least when the analysis has been confined to univariate models. This is usually taken to reflect differences in social class norms, access to and knowledge about contraception etc. Becker (1960) has argued for a positive income effect, as the demand for children as a "consumption good" would be likely to increase with increasing family income. On the other hand, he has suggested that couples want to increase both quantity and "quality" of children, and that an improved economic standard may result in

higher investment in each child rather than more children.

Cho (1968) was the first to observe, on the basis of data from the United States, that husband's income is positively related to fertility. In a study of European fertility Andorka (1978) states that there is no doubt about such an effect when education and occupation are controlled. Some other studies show little support for a positive effect of income, however (see e.g., Freedman and Thornton, 1988).

The importance of controlling for other variables has been stressed by Freedman (1963) and Bean and Woods (1974). They both found that the effect of income was positive when individuals in the same "social influence group" were compared, while the effect of actual income was negative in univariate models (when it was not controlled for socioeconomic characteristics).

Apparently there is general agreement that the effect of economic factors on fertility depends on age (Rindfuss and Sweet, 1978) and birth order (Bernhardt, 1972; Namboodiri, 1974; Simon, 1975). According to Rindfuss and Sweet, the husband's income has a large positive effect during the early stages of marriage and a much weaker effect at later stages.

Most studies we are familiar with deal with current income. This is rather unfortunate, as both current, previous and expected income probably enter into the fertility decision. Nevertheless, this may be an acceptable approach for the husband's income, which varies less over the adult life course than the woman's income.

When the effect of woman's income is discussed, the opportunity cost is an essential concept (see e.g., Mincer, 1963). Women who have a high income or a potential for a high income have more to lose as a consequence of childbearing and childrearing. This could explain an inverse relationship between fertility and a relevant income variable. As a determinant of the number of children at age 39 the current income at, say, age 35 would not be very interesting, since a low income by that age may be a <u>result</u> of a recent childbirth. A woman's wages per hour during the ages 20-35, which is an indication of <u>potential</u> contribution to the family income through paid work, would have been be a more preferable variable. Knowledge of the number of hours worked at age 35 would also have opened up for more advanced and insightful studies.

Unfortunately, we have only had the opportunity to examine the number of children at a certain age in the light of annual income four years earlier. We have focused our attention on women born in 1945, their number of children at age 39 and their annual income at age 35.

<u>Our results clearly suggest that fertility is depressed as the income of the woman increases.</u> Considering the brief discussion above, this should come as no surprise. One possible explanation might be that women with few children find it easier to combine family obligations with paid work. Or alternatively, the high income at age 35 indicates a generally high earning potential also at younger ages, so due to the high opportunity costs of childbearing, these women have fewer children. Previous studies from Norway indicate that there is a negative association betweenb women's wages and the number of children (Brunborg, 1984).

<u>According to our models, husband's income appears not to be related to the number of children.</u> This result does not agree entirely with those reported by Brunborg (1984). He estimated the income effects for a sample of women in various ages between 18 and 44, however, so his results are not strictly

comparable with ours. The positive effect of husband's income that he found may be due to the fact that his estimates are heavily influenced by the relation between income and fertility at younger ages, which is probably much stronger than at age 39.

9.3.9 The association between occupation and fertility

We have identified some occupational groups with particularly high or low fertility, but it is important to keep in mind that this refers to occupation at one particular point in time. Being for instance a nurse at age 35 does not imply that the woman has been employed as a nurse during most of her fertile period. She may indeed have been primarily a housewife from age 25 to 35. Truly, the educational level, which is taken to be one of our main explanatory variables, has also been registered at one or at most two points in time in our study, but this variable probably changes less over the adult life course.

We also want to emphasize that it is by no means evident from our results whether occupation has influenced family size or vice versa. There may also be spurious relationships. Having complete life histories of occupational status would not have solved this problem of causation, but the situation is even more difficult when we have only access to current occupation. For instance, some occupations that do not require full time employment may have been chosen by women who have many children. These women may have been engaged in other sectors of the labour market at a younger age.

Our results are summarized in table 9.5, which shows the net effects of occupation when it is controlled for age at marriage, place of residence, education of both spouses, religion of both spouses, and the parents' education. We have confined ourselves to a sample of married women who have not experienced a dissolution. Those working within industry or craft are chosen as a reference group. Their fertility appeared to be close to the average according to some univariate models that we have estimated (not shown in tables in the report). Within the industry and craft sector two subgroups were picked out as special categories: wood work and graphic work. This was done partly because some initial calculations indicated that these two groups represent the extremes within the industry and craft sector, partly on account of results obtained in divorce and mortality studies.

Table 9.5 shows that couples in which the women have medical or pedagogical work or the husband medical work have high fertility. So do the couples in which one or both of the partners are in the agricultural sector. Women engaged in charwork also have consistently high fertility, and in some of the cohorts those working in hotels and restaurants have quite large families. In addition, housewives have higher than average fertility. This, of course, was expected, as they may be housewives just because they have several children or have recently had another child.

These are the strongest relations between fertility and occupation. Besides, in some models clerical or administrative work for the woman or the husband appear to be associated with low fertility compared to the baseline group. Also sales and commerce, graphic work and artistic or literary work have come out with a few significant negative estimates, while there are positive estimates

Table 9.5   Net effect[2]) of woman's and husband's occupation, according to models for number of children among women living in stable marriages

Occupation[1])	Effect of woman's occupation				Effect of husband's occupation			
	1935 39	1945 39	1945 29	1955 29	1935 39	1945 39	1945 29	1955 29
Not employed, unknown	0.76*	0.41*	0.48*	0.37*	0.04	0.01	-0.05	-0.16*
Techn.,scientific,juridical work.....	-0.04	-0.03	0.06	-0.05	-0.01	0.02	0.02	-0.01
Artistic, literary work	0.42	0.10	0.09	-0.30*	0.06	0.00	-0.07	-0.08
Medical work...	0.38*	0.17*	0.25*	0.11*	0.29*	0.16*	0.12*	0.06
Pedagogical work.........	0.29*	0.10*	0.20*	0.11*	0.05	-0.02	-0.03	0.00
Religious work.	-	-	-	-	0.24	0.40*	0.22	0.12
Administration.	0.22	-0.23*	0.10	-0.13	0.01	0.02	0.03	0.02
Clerical work..	0.01	-0.15*	-0.02	-0.05	-0.14*	-0.10*	-0.03	0.03
Sales work, commerce.....	0.02	-0.04	-0.07	-0.06	-0.07	-0.01	0.01	-0.01
Agriculture, fishing......	0.68*	0.31*	0.46*	0.30*	0.17*	0.27*	0.18*	0.17*
Transport......	-	-	-	-	0.02	-0.01	0.00	-0.01
Wood work	-	-	-	-	0.02	0.11*	0.10*	0.03
Graphic work ..	0.11	-0.16	-0.07	-0.12	-0.13	-0.05	-0.12*	0.00
b Industry, craft (excl. wood, graphic work)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hotel, restaurant.........	0.24*	0.15*	-0.01	0.02	-0.09	-0.04	-0.10	-0.08
House porter, charwork.....	0.50*	0.34*	0.18*	0.23*	-0.04	-0.09	0.10	0.08
Other occupations......	0.16	0.11*	0.01	0.04	-0.04	0.03	-0.01	0.02

[1]) when the women were 25 or 35 years old
[2]) taken from tables 4.7, 5.8, 6.7, 7.7
b   baseline group
*   significantly different from 0.00 at 0.05 level

for <u>wood work</u> and <u>religious work</u>. Within the industry and craft sector we have found very little variation in fertility. Wood work and graphic work represent a maximum and minimum, respectively.

In general, <u>the woman's occupation is more closely related to fertility than the husband's occupation</u>.

Our results do not deviate much from those reported by other investigators. In particular, we refer to works by Kiser et al. (1968) and Cho et al. (1971), whose analysis of occupational fertility is very detailed. Based on the 1960

Census in the United States they have for several occupational groups estimated cohort fertility for ever married women (which at that time was close to the overall cohort fertility) or total period fertility. Both studies indicate that women whose men are farmers or labourers have many children compared to other women, while professionals, managers, clerical workers, service workers, and sales workers have relatively few children. This empirical structure is largely confirmed by Rindfuss and Sweet (1978) and the Norwegian studies of fertility among the currently married (Dyrvik, 1976; Central Bureau of Statistics, 1988).

Also on a more detailed level there is a good correspondence with results reported elsewhere. For instance, Kiser et al. have calculated that within the industry and craft sector, graphic work is associated with low fertility and wood work with high fertility. Kiser et al. and Cho et al. have also found that clergimen and physicians have higher fertility than teachers. Waiters and bartenders appear to have low fertility according to these studies - lower than others in the service sector. With respect to the woman's own occupation, they conclude that nurses have high fertility and secretaries low, but opinions differ as to whether teachers should be ranked higher or lower than average. Furthermore, it is stated that charwork is associated with high fertility.

O'Connell and Rogers (1982) have found that female managers and administrators have the lowest fertility, followed by sales and clerical workers and professionals. The highest fertility was found among women working on a farm.

To our knowledge, very little speculation has been offered in the literature as to how these occupational fertility differentials should be explained. In the following we advance a few ideas on possible interpretations of the empirical results. The discussion refers to income, labour force participation, access to childcare facilities and ideological factors.

Inclusion of the husband's income does not change the estimated effects of occupation. For instance, the fairly high fertility among men working in the health sector, who are primarily physicians and dentists, is not explained by their high income. With respect to the woman's occupation, however, income differentials may throw some light on the empirically observed relations reported above. It appears that the low fertility within administration and graphic work is partly "explained" by high income, and that the high fertility within agriculture and the service sector (hotel and restaurant work, charwork) is "explained" by low income. The interpretation of these results should not be made, however, without reference to number of hours worked. For instance, women may have chosen to work as charwomen because they have many children and this sector offers part time employment (which, in turn, gives a lower annual income). On the other hand, full time employment may often be required in administrative work, and therefore women with large families are not attracted to this sector. We also emphasize, however, that our results may be taken as a suggestion of a true income explanation. There is probably a correlation between current and previous occupation, and the wages per hour (and not only the total annual income) is usually reported to be considerable lower within restaurant work than within administration. A higher earning potential may give higher opportunity costs of childbearing and consequently lower fertility.

Practical problems related to child care may also have a considerable impact

on fertility differentials. When couples with one or both of the spouses working on a farm have higher than average fertility, it may indicate that it is easier for them to take care of children in such a situation. As child care has traditionally been the woman's responsibility - and usually is in our modern society as well - one would perhaps expect that a woman's employment in the agricultural sector has a greater impact on fertility than her husband's occupation. This also appears to be the case, just as the variable "woman's occupation" is generally a more important determinant than "husband's occupation". The high fertility of teachers may also be viewed as a result of the profession allowing a more practical combination of child care and employment - on account of the long holidays, the flexibility in the working time due to a large proportion of home work, etc. This may also be the case for women in the health sector, who are mainly nurses. Nurses as well as teachers probably have fairly easy access to part time employment. Moreover, the night and evening shifts in the health sector may offer some practical advantages to women who have a husband with whom they can share responsibility for the children - though the disadvantages to the family life are also obvious. Another explanation may be that nurses proabably are faced with a better situation with respect to kindergardens than many other women. For women in charwork it may also be somewhat easier to combine paid work and child care, as they may have more opportunity for part-time work and often at a time outside traditional working hours.

We believe that ideological factors also play a large role with respect to occupational fertility differentials. In particular, we note that men engaged in religious work tend to have many children. This may be due to a more traditional set of values where self-realization and individualism has a less central position, and which, in turn, implies that more time is allocated to family life. Egalitarian principles about sex roles may also be less dominant, so it is probable that the wife has spent relatively few hours in paid work during her fertile period. (We have no control for such a factor in our models, though the employment and occupation at one point in time are included.) It is also possible that ideological factors are a crucial driving force explaining the high fertility of female teachers and nurses. It is not difficult to assume that women who choose to work with children, teenagers and people who are ill, consider child rearing less of a burden.

9.4   Childlessness

In this report we have presented estimates of childlessness that are more reliable than those presented earlier (Noack and Østby, 1981), as our data set is very large.

It appears that only about 3 per cent of all women born 1945 who lived in a never broken first marriage up to age 39 are childless. We want to emphasize, however, that because of selection mechanisms this should not be taken as a maximum estimate of biological infecundity. The main reason is that some marriages are contracted just because the woman has become pregnant. Moreover, we know that childless marriages have a higher dissolution propensity, so that some of the couples who are involuntarily childless may have divorced before age 39.

There are some interesting variations in the proportion childless among women born 1945 who lived in first marriage at age 39. Among married women with the highest education (level 7) 10 per cent are childless, and at a slightly lower level (level 6) 6 per cent are childless. There are also some regional variations: In the non-rural areas of Eastern Norway 5 per cent of the married women have not entered motherhood. No groups that we have identified reveal a proportion considerably smaller than 3.

Among the never married the proportion childless varies much more than among the married. For women at the lowest educational level (level 2) the proportion is 68 per cent (among the 5 per cent who have never married at age 39). At the highest level (level 7) 18 per cent have never married, and 90 per cent of these women are childless. In Southern Norway 85 per cent of the never married are childless, while the corresponding proportion in Northern Norway is 53 per cent.

9.5   Very large families

We have briefly studied the prevalence of large families in the 1945 cohort. Among women still living in their first marriage at age 39 only 2.8 per cent have five or more children. There are large social and regional variations, however. For instance, only 0.4 per cent of the women with the highest educational level have such a large family, while the proportion is 10.3 per cent in the rural areas of Southern Norway. We are able to identify groups consisting of 50-200 women where more than 15 per cent have five or more children.

REFERENCES

Andorka, R. (1978). Determinants of fertility in advanced societies. Methuen & Co Ltd. London.

Bean, F.D. and C.H. Wood (1974). Ethnic variations in the relationship between income and fertility. Demography 11 (4) : 629-640.

Becker, G.S. (1960). An economic analysis of fertility. In National Bureau of Economic Research (ed): Demographic and economic changes in developed countries. Princeton: Princeton University Press.

Berge, E. (1974). Regionale variasjonar i fertiliteten i Norge omkring 1970. (In Norwegian only). Arbeidsnotater. Central Bureau of Statistics. Oslo.

Bernhardt, E.M. (1972). Fertility and economic status - some recent findings on differentials in Sweden. Population Studies 26: 175-184.

Borgan, J.-K. and L.B. Kristofersen (1986). Dødelighet i yrker og sosio-økonomiske grupper 1970-1980. (Summary, tables and figures in English). SA 56. Central Bureau of Statistics. Oslo-Kongsvinger.

Brunborg, H. (1979). Cohabitation without marriage. ART 116. Central Bureau of Statistics. Oslo-Kongsvinger.

Brunborg, H. (1984). An economic model of fertility, sex and contraception. Ph. D. thesis. SØS 56. Central Bureau of Statistics. Oslo-Kongsvinger.

Brunborg, H. and Ø. Kravdal (1986). Fertility by birth order in Norway. A register based analysis. (Summary, tables and figures in English). Rapport 86/27. Central Bureau of Statistics. Oslo-Kongsvinger.

Brunborg, H. (1988). Cohort and period fertility. (Summary, tables and figures in English.) Rapport 88/4. Central Bureau of Statistics. Oslo-Kongsvinger.

Bumpass, L.L., R.R. Rindfuss and R.B. Janosik (1978). Age and marital status at first birth and the pace of subsequent fertility. Demography 15 (1): 75-86.

Central Bureau of Statistics (1987). Population statistics. Vol III. Survey. (Summary, tables and figures in English). NOS B 714. Oslo-Kongsvinger.

Central Bureau of Statistics (1988). Barnetall i ekteskap. (In Norwegian only). Rapporter 88/21. Central Bureau of Statistics. Oslo-Kongsvinger.

Cho, L.-J. (1968). Income and differentials in current fertility. Demography 5 (1).

Cho, L.-J., W. H. Grabhill and D J. Bogue (1970). Differential current fertility in the United States. Community and Family Study Center. University of Chicago.

Davis, K. and J. Blake (1956). Social structure and fertility: An analytical framework. Economic development and cultural change 4 (3) : 211-235.

Dyrvik, S. (1976). Ekteskap og barnetall - en gransking av fertilitetsutviklinga i Norge 1920-1970. (Summary and tables in English). ART 89. Central Bureau of Statistics. Oslo-Kongsvinger.

Easterlin, R.A. (1969). Towards a socio-economic theory of fertility. In Behrman et al. (eds.): Fertility and family planning: A world view. Ann Arbor: University of Michigan Press.

Fawcett, J. (1973). Psychological perspectives on population. New York: Basic Books.

Fishbein, M. (1972). Towards an understanding of family planning behaviour. Journal of Applied Social Psychology 2 : 214-227.

Freedman, D. (1963). The relation of economic status to fertility. The American Economic Review 53 (3) : 414-426.

Freedman, R. (1975). The sociology of human fertility: An annotated bibliography. A Population Council Book. New York.

Freedman, D. S. and A. Thornton (1982). Income and fertility: the elusive relationship. Demography 19 (1): 65-78.

Hoem, J.M. (1975). Fertility and out-migration. Reflections on research approaches in empirical investigations of the association between two demographic phenomena. In: Social and demographic interaction. An interdisciplinary report on social and demographic research. Ballinger. Cambridge, Massachusetts.

Jensen, A.-M. (1981). Barnetall og yrkesaktivitet. (Summary, tables and figures in English.) ART 132. Central Bureau of Statistics. Oslo-Kongsvinger.

Jensen, A.-M. (1983). Flere i yrke - færre barn?. (Summary, tables and figures in English.) ART 147. Central Bureau of Statistics. Oslo-Kongsvinger.

Kiser, C.V., W.H. Grabhill and A.A. Campbell (1968). Trends and variations in fertility in the United States. Harvard University Press. Cambridge, Massachusetts.

Kravdal, Ø. (1986). Teknisk notat om oppbygging av Mødrefilen, Ekteskapsfilen og Kvinnefilen. (In Norwegian only.) Interne notater 86/27. Central Bureau of Statistics. Oslo-Kongsvinger.
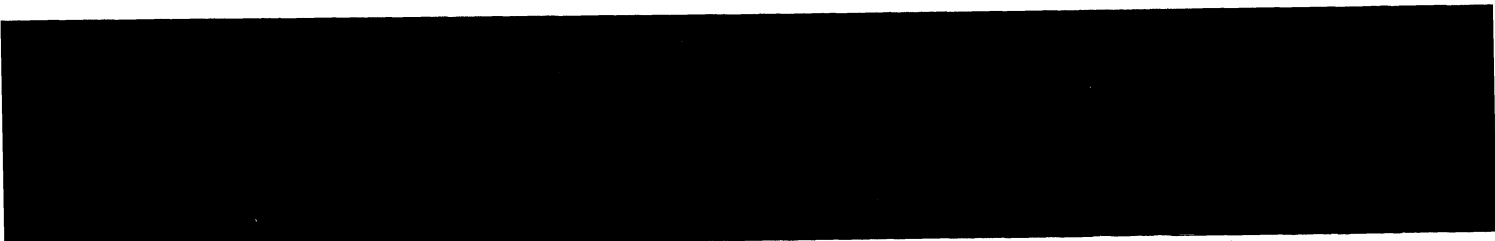
Kravdal, Ø. and T. Noack (1988). Skilsmisser i Norge 1965-1985. En demografisk analyse. (In Norwegian only). Rapport 86/6. Central Bureau of Statistics. Oslo-Kongsvinger.

Kravdal, Ø. and T. Noack (1989). Skilsmisser og sosioøkonomisk status. (In Norwegian only). Forthcoming in the series SØS. Central Bureau of Statistics. Oslo-Kongsvinger.

Kristiansen, J. E. (1983). Ekteskapelig stabilitet og fruktbarhet. Er det noen sammenheng? (In Norwegian only). Paper presented at a seminar on fertility research, Sundvollen, Norway, 16-18 March 1983.

Leibenstein, H. (1975). The economic theory of fertility decline. Quarterly Journal of Economics 89 (1) : 1-31.

Leridon, H. (1977). Human fertility. The basic components. University of Chicago Press. Chicago, London.

Lesthaege, R. and J. Surkyn (1988). Cultural dynamics and economic theories of fertility change. Population and Development Review 14 (1) : 1-45.

Michael, R.T. (1973). Education and the derived demand for children. Journal of political Economy 81 (2) : 128-164

Mincer, J. (1963). Market prices, opportunity costs and income effects. In C. Christ et al. (eds.). Measurement in Economics. Palo Alto: Stanford University Press.

Namboodiri, K. (1972). Some observations on the economic framework for fertility analysis. Population Studies 26 (2) : 185-206.

Namboodiri, K. (1972). Which couples at given parities expect to have additional births?. An exercise in discriminant analysis. Demography 11 (1) 45-46.

Noack, T. and L. Østby (1981). Fertility among Norwegian women. Results from the Fertility Survey 1977. (Summary, tables and figures in English SØS 49.). Central Bureau of Statistics. Oslo-Kongsvinger.

O'Connell, M. and C.C. Rogers (1982). Differential fertility in the United States: 1976-1980. Family Planning Perspectives 14 (5) : 281-286.

Ritchey, P.N. and C.S. Stokes (1972). Residence background, migration and fertility. Demography 9 (2) : 217-230.

Rindfuss, R.R. and J. A. Sweet (1977). Postwar fertility trends and differentials in the United States. Studies in Population. New York: Academic Press.

Simon, J.L. (1975). Puzzles and further explorations in the interrelationship of successive births with husband's income, spouses' education and race. Demography 12 (2) : 259-274.

Sweet, J.A. and R.R. Rindfuss (1983). Those ubiquitous fertility trends: United States, 1945-1979. Social Biology 30 (2) : 127-139.

Vassenden, K. (1987). Folke- og boligtellingene 1960, 1970 og 1980. Dokumentasjon av de sammenliknbare filene. (In Norwegian only.) Rapporter 87/2. Central Bureau of Statistics. Oslo, Kongsvinger.

Westoff, C.P. and N.B. Ryder (1977). The contraceptive revolution. Princeton University Press, Princeton.

Willis, R.J. (1973). A new approach to the economic theory of fertility behaviour. Journal of Political Economy March-April supplement.

Østby, L. and K. S. Bull (1986). Omfang og utbredelse av samliv uten vigsel. (In Norwegian only). Tidsskrift for Rettsvitenskap 1-2 : 140-166.

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