Statistics Norway
Research Department

Marit Rønsen

Documents

Fertility and Public Policies - Evidence from Norway and Finland

Statistics Norway
Statistisk sentralbyrå

Documents 98/12 • Statistics Norway, June 1998

Marit Rønsen

Fertility and Public Policies - Evidence from Norway and Finland

Abstract:
During the late 1980s and early 1990s fertility fell to unprecedentedly low levels in many European countries, while the Nordic countries experienced rising fertility rates that approached replacement level. This sparked a renewed research interest in the possible pronatalistic effects of the generous family policy programs of the Nordic welfare states. Several studies appeared from Sweden, investigating the effects of female wages and program benefit components on fertility (Heckman and Walker 1990, Tasiran 1994, Walker 1995, Klevmarken and Tasiran 1996). This paper complements the former Swedish studies with evidence from Norway and Finland. The results confirm that the female wage rate has had a negative effect on the timing and spacing of childbirths, but the estimated effects are smaller than those reported in Heckman and Walker 1990. Further, there are indications that extensions of the maternity leave period have had a positive impact on fertility, but mainly on higher order births, and especially in Finland where the extensions have been larger and more frequent.

Keywords:
Fertility dynamics, female wages, public policies, multistate duration model.

Acknowledgement:
This research is part of the project "Fertility and Employment in the Nordic countries". Thanks are due to the Joint Committe of the Nordic Social Science Research Councils for financial support and to Statistics Finland for providing the data for the Finnish analysis. The paper was first presented at the 11th Annual Meeting of the European Society for Population Economics (ESPE), Colchester, 19-21 June 1997. I have further benefitted from fruitful discussions with project leader Lars Østby and members of the project's reference group: Fjalar Finnäs, Britta Hoem and Kari Skrede. The lastmentioned has also kindly read and commented upon the present version of the paper.

Address:
Marit Rønsen, Division for Social and Demographic Research, Statistics Norway, P.O.Box 8131 Dep, N-0033 Oslo, Norway. E-mail: marit.ronsen@ssb.no

Contents

1. Introduction

Since the 1980s fertility has fallen to unprecedentedly low levels in many western industrialized countries. The Nordic countries have, however, experienced a rise in fertility from the early 1980s, which at the beginning of the 1990s stabilized not far below replacement level. This has lead to a renewed research interest in the possible pronatalistic effect of the generous family policies of the Nordic welfare states, including extensive parental leave, subsidized child-care and other economic support to families. Walker (1995) has, for example, investigated the case of Sweden, comparing the period fertility rate during 1955-1990 to a constructed macro time series of the shadow price of fertility that includes program benefit components. The estimated price series exhibit a negative relationship with period fertility rates, and changes in the relative prices of fertility over the life cycle may have been an incentive to postpone childbearing to higher ages.

So far there are few studies of policy effects based on individual data, mainly because of a lack of appropriate information on life-cycle wages and benefits. Some attempts have been made to estimate price effects for Sweden, using individual fertility and employment histories, but imputing wages from a limited time series of macro data (Heckman and Walker 1990) or estimating wage profiles based on information from a small part of the labour market (shop assistants in wholesale and retail trade: Tasiran 1994; Klevmarken and Tasiran 1996). In all studies the woman's wage is found to have a negative effect on the timing of birth, but the results differ considerably in magnitude and significance. None of the Swedish studies render much support for the notion that family policies have stimulated fertility, however.

In this study I explore these issues further, estimating the timing to first, second and third birth in a hazards-model framework based on data from similar Family and Fertility Surveys in two other Nordic countries, Norway and Finland. For both countries, indicators of the expansion of the parental leave program and the supply of public day-care are used to estimate program effects on fertility. For Norway I also have access to high quality register information on income to estimate the effect of female wages, which will be compared with the previous results from Sweden.

2. A brief history of fertility and public policies in Finland and Norway

2.1 Fertility trends

Like many other countries, Finland and Norway experienced a «baby boom» just after the second world war. The «boom» was, however, more short-lived in Finland than in Norway, and there are also other dissimilarities in the time trends (Figure 1). Finland had the highest post-war fertility level with 3.41 children per women in 1946 against 2.74 in Norway. Over the next decades, the Finnish rate decreased continously. By 1960 it had fallen below the Norwegian rate and reached a historically low peace-time level of 1.5 in 1973. The Norwegian fertility level also fell shortly after 1946, but at the beginning of the 1950s a long upward trend started, culminating with a total fertility rate of 2.98 in 1964. Thereafter there was a long period of declining fertility, levelling off around 1977 and reaching an absolute all time low of 1.66 in 1983-84. From the mid-1980s fertility has again risen in Norway, with a top rate in 1990 of 1.93. It has remained close to this level since, and is at present (1996) 1.89, one of the highest period rate in Europe. The Finnish pattern since the early 1970s exhibit a pattern with more fluctuations: rising rates during the mid 1970s and in the early 1980s, and declines in the late 1970s and mid 1980s. Since 1987 the total fertility rate has also been increasing in Finland, and has recently stabilized around a level of 1.8.

It is beyond the scope of this paper to discuss in detail the reasons behind the different post-war fertility patterns in Norway and Finland, but a couple of points may be mentioned. Having suffered major human losses during the war and being forced to hand over valuable land and make large reparation payments to the Soviet Union afterwards, Finland was in a much more severe situation, economically and otherwise, than Norway where the loss of human lives were relatively small and where there was no war debt to pay. Instead Norway became one of the largest recipients of economic support per capita from the Marshall plan. By the mid 1950s Finland had recovered from the effects of the war and by 1960 their gross domestic product was on par with Norway (Figure 2). Due to a lack of male labour after the war, Finnish women joined the work-force in large numbers to help rebuild the country. As a result, the female employment rate soon became very high, and stayed high throughout the 1950s and early 1960s, which was the great era of the housewives in Norway. These may be some reasons behind the less pronounced «baby boom» in Finland after the war. Another reason may be that the demographic transision in Finland had not come as far as in Norway before the war, where the average total fertility rate for 1931-40 was only 1.87, while the corresponding rate for Finland was 2.39.

It is a well known fact that period fertility fluctuates more than completed fertility (cohort fertility). Among the after-war generations, which will be analysed more closely in this paper, completed fertility has been higher in Norway than in Finland. The 1945 cohort has for example given birth to 2.45 children in Norway, while they have completed at 1.87 in Finland. Among successive Norwegian cohorts fertility has fallen gradually and is just above 2 children per women for cohorts born at the end of the 1950s. In Finland there has been a week increase in cohort fertility for women born after 1950, rising from 1.85 among the 1950 cohort to 1.92 among cohorts born at the end of that decade.

2.2 Public policy expansion

The Nordic welfare states have a long tradition of extensive social policies directed at the family. These policies have not primarily been motivated by pro-natalistic concerns, but rather by gender equality ideologies and the general well-being of children and their families. The programs with greatest implications for the cost of a child are no doubt the statutory universal maternal and parental rights in connection with birth and the supply of subsidized child care, which will be briefly reviewed in this section.

In Norway a universal right to paid leave in connection with birth dates back to 1956 and in Finland to 1964. The original benefit period was 12 and 9 weeks, respectively. Benefits were not taxable and income compensation was relatively low, about 45 per cent in Finland and a flat rate of NOK 4 per day plus 0.1 per cent of prior earnings in Norway. During the 1970s the leave program in Finland was extended several times (Figure 3). By 1974 the entitlement period had been prolonged to about six months (29 weeks), and by 1981 it had reached almost ten months (43 weeks). Since 1987 the parental leave in Finland has been 263 weekdays or about 44 weeks, except in 1991-1992 when it was temporarily two weeks longer. Fathers have been entitled to share some of the leave since 1978. In the beginning this right was limited to two weeks, but later fathers' entitlement was prolonged in tandem with the general extension of the leave program. Since 1985 fathers may share all except the first 100 (since 1987: the first 105) days of the parental leave. In 1982, there was a major increase in the Finnish income compensation. The replacement level was raised to 80 per cent during that part of the leave that was reserved for the mother, and to 70 per cent for the remaining period. The benefits were made taxable and were included in the pension basis. Since 1983, earnings above a ceiling have been compensated for at a reduced rate. After 1991 further cuts have been made, resulting in a maximum replacement rate of 66 percent from 1994 (The Social Insurance Institution 1994).

In Norway there have been fewer changes in the leave program. The first extension was in 1977, when the benefit period was prolonged to 18 weeks and fathers became entitled to share the leave, except for the first six weeks which were still reserved for the mother. In 1978 the benefits were raised substantially to cover 100 percent of former income for most working mothers and were made taxable and pensionable. Then there were no further extensions until 1987 when the entitlement was prolonged to 20 weeks, and in 1988 two more weeks were added. Since 1993, maternity benefits are granted for a period of 42 weeks with full pay or 52 weeks with 80 per cent compensation. Unfortunately, it is not possible to study the effect of the rapid expansion between 1988 and 1993 in this study, as the available Norwegian data were collected just before that (1988).

Maternal or parental benefits are based on prior earnings in both countries. In Finland the benefits are calculated on the basis of the latest earnings record with the tax authorities, but if earnings immediately before birth are significantly higher (more than 20 per cent), the benefits may be calculated on the basis of the last six months. Mothers with no previous registered earnings receive a minimum flat rate payment, which in 1989 (the year of interview for Finland) amounted to FIM 52 per day (about FIM 13 700 for the whole period). The Norwegian leave program requires a certain amount of employment during pregnancy in order to acquire eligibility for benefits. Before 1977 the requirement was eight months employment during the last ten months prior to birth; later it was reduced to employment in six of the last ten months. Mothers who did not fullfil this criterion were granted a tax-free cash benefit at delivery, amounting to NOK 4 730 in 1988 (the year of interview for Norway).

After the expiry of the paid parental leave, parents of both countries are also entitled to a period of unpaid leave. In Norway a right to leave with job security until the child was one year old was enforced in 1977. Finnish parents did not get similar rights until the special home care allowance scheme was introduced in 1985. This is a unique Finnish scheme, which allow parents to choose between a place in a public day-care institution or an extra income transfer to stay home and take care of the child on their own (Ilmakunnas 1997). Between 1985 and 1990 the system was gradually extended, and from 1990 all parents have been entitled to home-care allowance until the child is three years old. The parents have a statutory right to return to their employer when the home-care leave expires. The home-care allowance is taxable and consists of a basic payment, sibling supplement and an income tested additional payment. In 1989, the basic payment was FIM 1 210 per month and the maximum additional payment was FIM 968 per month. In addition, some municipalities grant an extra home-care allowance, which varies considerably from one municipality to another.

Public day-care has expanded rapidly in both countries since the early 1970s (Figure 4). Norway has, however, always lagged behind Finland in the provision of subsidized child care. In 1973 about 5 percent of Norwegian pre-school children had a place in public day-care, while the Finnish coverage rates was twice as high. By 1980 enrolment included 21 percent of Norwegian and 28 percent of Finnish pre-schoolers, and ten years later the Finnish proportion had risen to 45 per cent while the corresponding Norwegian proportion was 36 per cent. Since the full implementation of the home care allowance program in 1990, the Finnish coverage rate has actually declined, and was down at the Norwegian level in 1992 (about 40 per cent). Later it has fallen even further. Generally, enrolment rates are lower for children aged 0-2 years than for 3-6 year-olds (Nordic Council of Ministers 1995).

Parents' fees are largely subsidized, and vary considerably from one municipality to another. Generally, the fees increase with family income and decrease with the number of siblings in care. Norwegian parents pay relatively high fees, but may on the other hand deduct some of the cost from their taxable income, which Finnish parents cannot. Single parents pay a reduced rate. Not surprisingly, public day-care has generally been in short supply in both countries. The excess demand has been met by several forms of private child care, for example by relatives or «day-mummies», au pair girls or private day-care centres.

3. Theory and methods

3.1 Conceptual framework

Modelling the timing and spacing of births requires a dynamic framework. I shall employ a dynamic reduced form fertility model, which builds on the theory of dynamic structural models, but does not involve the estimation of structural parameters. The individual is assumed to maximize the expected, discounted value of utility over the life-cycle $t=\tau, \ldots, T$:

$$\max E_\tau \sum_{t=1}^{T} \lambda^t U(N_t, F_t, C_t, L_t, \theta) \qquad (1)$$

where U is the period utility function at t, λ is the discount factor, N_t is the number (zero or one) of current births, F_t is current family size ($F_{t+1}=F_t+N_t$), C_t is a composite consumption good, L_t is household or leisure time (= non-work time) and θ is a preference parameter. The women (and her partner) is assumed to exercise perfect fertility control and to be fully fecund. Maximization is subject to a sequence of budget constraints for each period t:

$$Y_t + w_t(H-L_t) = C_t + p_t F_t, \qquad (2)$$

where Y_t is current non-labour income (e.g. partner's income), w_t is the individual's net after-tax market wage, H is the total time available for market- and household work (incl. leisure) and p is the unit cost of F_t (net of possible child subsidies and family allowances). $H-L_t$ is thus the mother's labour market hours. The full cost of fertility includes direct child expenses plus the opportunity cost of foregone earnings. If lost work experience reduces the woman's earnings potential or at least prevents it from growing as fast as it would do otherwise, time taken off work may also reduce Y_t in future periods. This element of the opportunity cost may depend on the initial endowment of human capital (education) and previous work experience (e.g. type of job, length of service or seniority). Decisions about the timing and spacing of births are thus likely to be influenced by the economic environment, including the tax-benefit system, as well as by personal characteristics, such as financial assets and human capital. The spacing may also be affected by considerations of possible economics of scale, i.e. it may be cheaper to raise (clothe, care for etc.) two children who are close in age than two who are several years apart.

The woman decides to give birth if the expected lifetime utility of having a(n) (extra) child exceeds the expected lifetime utility of not having a(nother) child given her budget constraint. The variable of interest in thus the likelihood of a conception. When the likelihood is regarded as continuously-varying, hazards-rate analysis is a useful tool. In this approach, women are assumed to be continuously subject to the risk of conception. The risk is given by the hazard rate, defined as the conditional probability of conception at time t, given that no conception has taken place before that time, or formally:

$$h(t) = \lim_{\Delta t \to 0+} [P(t \leq T < t + \Delta t \mid T \geq t)] / \Delta t \qquad (3)$$

where h(t) is the hazard rate and P(.) is the probability of experiencing the event in the time interval Δt. The birth process is typically a process with repeated events.A woman becomes at risk for the first conception at calendar time t=0, the age of menarche, and her origin state is parity zero. If she conceives and gives birth, she moves on to the next state under risk, parity one. If she has yet another child, she moves on to parity two and so forth. We then have a repreated-events or multistate duration model. The basic component of the multistage duration model is the conditional hazard. Let the potential durations be $T_1, \ldots, T_C$. If a woman becomes at risk for the jth birth at time $\tau(j-1)$, the conditional hazard at duration t_j is defined to be

$$h_j(t) \equiv h_j[t_j \mid Z(\tau(j-1)+tj)] \qquad (4)$$

where $Z(\tau)$ is the relevant conditioning set at time τ. This consists of variables that influence the woman's transition to the next birth, including all relevant past information up to time τ (e.g. previous birth intervals, etc.), but also possible anticipations about the future formed at time τ. A necessary condition for including anticipatory variables is that their values are perfectly forecastable at time τ. For further discussion and details see Heckman and Walker 1990 or Arroyo and Zhang 1997.

3.2 Empirical specification

There are many possible parametric specifications for the hazards function in (4). The choice may be based on a priory assumptions or on previous empirical evidence. There is little a priory guidance as to the functional form of the birth hazard. In previous empirical research of the fertility process in Sweden, Heckman and Walker (1990) chose for example a Weibul model, while Tasiran (1994) and Klevmarken and Tasiran (1996) used a quadratic hazards model. Another alternative is to use a more flexible semi-parametric model, which makes no assumptions about the functional form of the baseline hazard. As a first approach I have chosen the latter procedure, specifying a Cox proportional hazards model as follows:

$$h_j(t) = h_{0j} \exp\{Z[\tau(j-1)+t_j]\beta_j\}, \qquad (5)$$

where h_0 is the baseline hazard and β is a vector of parameters in the transition to birth number j. A disadvantage of the Cox model is that it does not estimate the baseline hazard, i.e. there is no parameter indicating the shape and thus the duration dependence of the hazard. The only assumption is that the vector of explanatory variables has a proportional effect on the baseline hazard, i.e. for any two individuals at any point in time, the ratio of their hazards is constant. In later work I shall also explore the fit of other hazards models.

As pointed out by several authors, unobserved heterogeneity may be a problem in hazard rate models due to unobserved differences across individuals (for a review, see Arroyo and Zhang 1997). Unobserved heterogeneity that is not accounted for tends to produce a negative bias in the time-dependence of the hazard, and may also affect the estimated coefficients of model covariates. In multistate duration models another souce of bias is ommitted unobservables that may be correlated across states (i.e. across parities of an individual's fertility history). Later work will also take individual-specific and parity-specific heterogeneity into consideration.

The estimates of the hazards of first, second and third conception are obtained by maximum likelihood estimation. Assuming so far that no unobserved variables are common to or correlated across parities, I estimate each parity separately. The danger of using this so-called «piecemeal strategy» is discussed in detail in Heckman and Walker (1990). However, when tested on Swedish data, they find that serially correlated unobservables only play a negligible role, indicating that the computationally less demanding piecemeal strategy would yield consistent estimates. Since the Nordic countries are similar in many respects, it may be reasonable to expect the same to hold also for Finland and Norway. However, this will be tested more carefully in future work.

4. Data and variables

4.1 Sample

The analysis is based on data from similar Fertility and Family Surveys which are part of a large international comparative project co-ordinated by the United Nations Economics Commission for Europe. Norway and Finland were among the first of about 20 industrialized countries to complete their surveys, the 1988 Norwegian Family and Occupation Survey and the 1989 Finnish Population Survey. The data contain complete retrospective life histories on childbearing, cohabitation and marriage, educational activities and employment from national representative samples of selected cohorts. The Norwegian survey has also been linked with register data on income from the Directorate for Taxation, migration histories derived from the Central Population Register and municipality time-series data on public day-care coverage from the Norwegian Social Science Data Services. Interviews were obtained from a total of 4019 Norwegian women born in 1945, 1950, 1955, 1960, 1965 and 1968, and 4155 Finnish women born each year 1938-67. To get a more similar cohort structure, I have excluded the youngest Norwegian cohort (1968) and the oldest Finnish cohorts (born before 1943), and grouped the remaining Finnish cohorts into 5-year intervals with mid-points equal to the Norwegian birth-years.

The start of the fertility process is set at age 15, which excludes two Norwegian women with earlier conceptions. The final analysis sample for first conception consists of 3639 Finnish and 3296 Norwegian women. In the analyses of transitions to higher parities, women with a multiple last birth have been excluded. The number of women who proceed to partiy one and the risk of a second conception is 2511 and 2355 for Finland and Norway, respectively. When estimating transitions to parity three, women who were single at second birth are also excluded, as they constitute a very small group (1-2 per cent)[1] at this stage. This leaves 1715 Finnish and 1630 Norwegian women under risk of third conception.

4.2 *Covariates*

The explanatory variables in the model can be devided into three categories: (i) background adolescence characteristics that are believed to form preferences and other preference indicators, (ii) demographic variables, (iii) human capital variables and (iv) fertility price indicators. Descriptive statistics of time constant covariates are given in table 1.

Variables belonging to the first group are the woman's social background and her number of siblings, as well as own religiousity and marital status. *Social background* is the socioeconomic status of the main breadwinner of the parental household, usually the father. The influence of social background on own educatonal aspirations and future working career is well known. Daughters of manual workers are for example likely to finnish school early and end up in lower educational groups themselves. They also tend to start family formation and enter motherhood at younger ages than women from higher social classes (see e.g. Kiernan 1995). The *number of siblings* a woman have may form preferences as to own family size. Coming from a large family may make it more attractive to have a large family oneself, although the opposite effect could be imagined if the size of the adolescent family involved economic hardship.

Fertility studies from several countries have found religiousity to be a good indicator of preference differences (see e.g. Kravdal 1996; Groot and Pott-Buter 1992), and it has therefore been included among the covariates. For Norway the indicator is *religious activity*, where high is defined as attending church at least six times per year. In the Finnish survey the activity categories are not quite comparable, and information on *religious conviction*, which is unique to the Finnish data, have been used in stead. Women who report that they are believers make up one group, while the other group consists of the remaining women (religiously inclined, religiously indifferent, sceptical or negative to religion).

Marital status may reflect differences in budget constraints, especially when non-labour income is not controlled for, but it has also been shown to reveal variation in preferences. Lesthaege and Moors (1995) have e.g. established a clear negative association between cohabitation and traditional family values. In analyses of mothers' employment following birth, woman who married directly without prior cohabitation are seen to be less likely to return to work, and especially to a full-time job (Rönsen and Sundström 1996 and 1997). The stronger family orientation among this marital group may also imply that they are more likely to give birth. To capture the preference element, marital status is devided in four categories: directly married, married after cohabitation, cohabiting and single.

In the analysis of the first conception interval, marital status is excluded as union formation is very closely linked to the fertility process at this stage. In fact, more than a third of the women in our samples changed marital status between the onset of pregnancy and first birth. As many as 38 per cent of Norwegian women and 33 per cent of Finnish women were single at conception, the proportions being highest in the oldest cohorts where cohabitation was infrequent. At first birth the proportion of single mothers had fallen to 13 and 8 per cent, respectively. Even around the transitions to higher parities changes in marital status were not uncommon, questioning the exogeneity of current status. Therefore, past marital status, measured at the time of last birth, has been used in the estimates.

The second group of covariates consists of the demographic variables, cohort, age at last birth and interbirth interval. *Cohort* is the woman's birth year, which for Finland has been grouped into five-year intervals (see section 4.1). To allow for a possible non-linear effect of *age*, *age squared* is also included. Age is measured at the time of last birth. *Interbirth interval* refers to the time between first and second birth, and is measured in years. Since all women are assumed to start the fertility process at the same age (age 15), age at first birth is a measure of the length of the first conception interval. As discussed in Heckman and Walker (1990), lagged birth durations are frequently used as proxies for

[1] This was also considered when analysing the second conception, but since single women still constituted 13 per cent for Norway (8 per cent for Finland) at that time, they were kept in the analysis sample.

serially correlated unobservable heterogeneity, and if the unobservable is fecundability, women with low fecundability will have longer birth intervals. A long first spell should then be followed by long subsequent spells, and hence a negative coefficient of previous spells should be estimated in the hazard model.

The human capital variables education and work experience constitute the third group of variables. A large stock of human capital (higher education or longer work experience) is normally assumed to affect the likelihood of conception negatively, since it usually implies higher opportunity costs of childbearing (foregone earnings, human capital depreciation). However, some studies have also found evidence of higher second-birth and third-birth rates among well-educated women than among other women (Kravdal 1992, Sz.Oláh 1996). Since plans about education, employment and children may be formed simultaneously, these variables may possibly be endogenous in the fertility process. Here I shall treat educational level as exogenous, assuming that decisions about education is taken before decisions to have a baby. In the analysis of the first conception interval, education is a time-varying covariate, reflecting the many changes that take place after age 15. For later conception intervals, education is a time constant variable measured at last birth, since there are only minor time changes at that point. The *educational level* is given by the standard years needed to reach that level. Gymnasium level (secondary school) requires 11-12 years, and more than 12 years indicate at least a lower university or high school degree. The exogeneity of work experience is more problematic. If a working woman decides to postpone a birth for a year, her work experience may also increase by a year. In a recent analysis of Swedish fertility dynamics, Klevmarken and Tasiran (1996) found clear evidence of the endogeneity of work experience. My approach has been to exclude work experience when modelling the time to first conception, and to introduce it as a fixed covariate measured at last birth for transitions to later parities. It may then be regarded as predetermined and exogenous in that sense. *Work experience* is the accumulated full-time equivalent years worked before last birth.

As pointed out by Walker (1990), the female wage rate is the single most important determinant of the full price of fertility. In his macro study of the components of the shadow price of fertility in Sweden, he found that the contribution to changes over time from female wages was about twice the magnitude of other changes considered, including changes in the tax and benefit system. So far only a few studies have tried to incorporate components of the shadow price of fertility in individual-level dynamic fertility models, mainly because of lack of appropriate price data. Some attempts have been made to estimate price effects for Sweden, using individual fertility and employment histories, but imputing wages from a limited time series of macro data (Heckman and Walker 1990), or estimating wage profiles based on information from a limited part of the labour market (shop assistants in wholesale and retail trade; Klevmarken and Tasiran 1996). In both studies the woman's wage is found to have a negative effect on the timing of birth, but the effect is less pronounced and non-significant for the risk of first birth in the latter study.

Klevmarken and Tasiran also examine the effects of parental leave and the supply of public day-care, but find no significant effects of the extensions of the parental leave period. For public day-care the results were somewhat confusing: A positive, but non-significant, effect appeared for the risk of first birth, while the estimates for the second and third birth risks were negative and highly significant. The authors suggest that this must be because the variable captures something other than the intended supply differences. In a recent Norwegian study, Kravdal (1996) also finds a negative, but non-significant effect of public day-care on first and second birth probabilities, while there is a weak positive, but insignificant, effect on the probability of a third birth. A closer examination shows that there may be a positive effect of public day-care on very low coverage levels (5-10 per cent).

The present analysis introduces a fuller set of price indicators for Norway, and also extends the research to another Nordic country, Finland. Based on information of annual registered income for Norway, I have estimated individual wage profiles that have been adjusted for possible selection bias (see Rønsen 1992 for further details). Predicted *hourly wage* is expressed in Norwegian 1990 Kroner (NOK). The Finnish study does not, unfortunately, contain any income information, and the wage variable is therefore missing from the Finnish analysis. Since a woman's wage is a function of her work experience, current wages may also possibly be endogenous in the fertility process. For transitions to parity two and three I have therefore used predicted wage at last birth, which preceeds the current process and is exogeneous in that sense. When analysing the first conception interval this apprach is not feasible, since the process starts at age 15. Instead I use predicted wage as a time-varying covariate, but conditon on past values of human capital (observed at the end of the year preceeding the year of the current process time).

For both countries I study the effects of parental leave and public day-care coverage. Two components of the parental leave scheme are important for the price of fertility: (i) the benefit level and (ii) the benefit period. Since the first component is almost proportional to the woman's wage, the two variables are too highly correlated to be included in the same model. The duration of the benefit period thus serves as the indicator of the generousity of the *parental leave* program. For Finland, where the leave has been prolonged several times, this is a continuous variable, but for Norway where there were only a couple of extensions during the studied period, it is a categorical variable. The indicator of the supply of subsidized child care is *day-care coverage* defined as the number of spaces per pre-school children. For Norway, this information is available at the municipality level and for a sub-group of children aged 0-3, which is the rate used in the analysis. For Finland, municipality level data is not available, and the national coverage rate for children aged 0-6 has been used instead. Finally, for Norway, I have also included a time-series of *child benefits*, which are income independent, non-taxable cash transfers, increasing with each child up to the fifth.

5. Results

The parameter estimates of the hazard of first, second and third conception are given in Tables 2-4. All estimates are reported as relative risks, i.e. the coefficients have been exponentiated. For continuous variables the interpretation is then as follows: For each unit increase in the explanatory variable, the hazard is multiplied by the coefficient. For dummy variables, the coefficient gives the hazard of a specific group relative to the hazard of a chosen reference group. The tables report results from three different models for each transition. Model (I) has no fertility price indicators. Model (II) contains price indicators that are available for both countries, i.e. duration of maternity (parental) leave and day-care coverage. Since these policy variables are strongly time trended, they are highly correlated with birth cohort, which is clearly demonstrated by the change in the cohort estimates in Model (II). Model (III) therefore excludes birth cohort, and in the case of Norway also includes the other available price indicators, predicted hourly wage and child benefits.

The inclusion or exclusion of cohort has very little effect on the estimates of other covariates except on price and policy indicators and partly on education. Most results can therefore be discussed without reference to a specific model.

5.1 Background characteristics and preference indicators.

Not surprisingly, the greatest impact of social background is on the timing of first birth. The pattern in the two countries is very similar: daughters of manual workers have their first baby sooner than other social groups, while daughters of upper employees wait the longest. Among Norwegian women there are also significant social differences in the risk of second conception, but at this stage the highest risk is found among the reference group of mainly farmers' daughters. A similar, but non-significant pattern can also be observed for transitions to parity three. The Finnish estimates for birth orders two and three indicate a slightly different social pattern, as the highest conception risk is found among the highest social class.

Coming from a large family generally speeds up the fertility process. In Norway the risks of first, second and third conception are all positively affected, while in Finland it is mainly the timing of first birth that is affected.

In both countries religiously active women are found to delay the time to first conception, but having become mothers, they have higher risks of getting the second or third child. This pattern is as expected, since religious morals demand sexual abstinence before marriage, implying a later age of sexual debut, but encourage traditional and lasting family relationships with children as an integrated part. The negative effect of religiousity on the risk of first birth is masked in analyses that are limited to married or cohabiting women where a positive effect is observed even for transitions to parity one (see e.g. Groot and Pott-Buter 1992).

Due to the simultaneity of union formation and first conception, this study excludes marital status when analyzing this event. Moving on to parity one, women who were single or cohabiting at first birth are found to have a significantly lower risk of second conception than married women (Table 3), and for Finland there are also clear differences between the two groups of married women. Having probably stronger and more traditional familial values, women who married directly have a higher second birth risk than women who got married after a period of cohabitation. In the estimates of the third conception interval (Table 4), women who were single at second birth are excluded from the analysis, and there are no longer any significant difference between the remaining marital status groups. However, the estimated positive coefficient for cohabitants in Norway is a curiosity that will be investigated more closely in future work. It could indicate that these are new unions, and that the union order should be controlled for. In a recent study from Sweden, Sz.Oláh (1996) found for example a much higher second birth risk among women in higher union orders than among those in their first or second unions.

5.2 Demographic variables

Birth cohort reflects the fertility trend, and in Model (I), where cohort is the main trend factor, there is a clear negative gradient across cohorts for first conception in both countries. However, for transitions to higher parities the country patterns differ. While there is a declining risk of second conception across cohorts in Norway, there is a corresponding increasing risk in Finland. For this country the cohort gradient for third conception is also estimated to be positive, with the highest risk found among cohorts born around 1955. For Norway the highest risk is still found among the oldest cohort, and there is little difference between succeeding cohorts.

The effect of lagged birth intervals as expressed through age at first birth and interbirth interval, is negative as expected for interbirth interval (Table 4), but positive for age at first birth, although the positive effect declines with age (Table 3). Rather than indicating unobserved fecundability this probably reflects a fertility pattern that has been observed for some time in the Nordic countries: having delayed the first child, mothers seem to «catch up» on lost time by having the next baby sooner. This behaviour may also be motivated by economics of scale (smaller direct child costs and/or lower foregone earnings due to a compression of the mother's time out of paid work) and by public policies (e.g. priority to siblings in the allocation day-care spaces)[2].

5.3 Human capital variables

Higher education and longer work experience increase the opportunity costs of childbearing and hence lower the risk of conception. When not controlling explicitly for female wages, differences in human capital will also reflect wage differences. However, there may also be separate net effects of these variables, indicating for example unobserved differences in work and family preferences. This is confirmed by the Norwegian results in Table 2-4 where the estimated effects of education do not change much when hourly wage is included (Model III vs. Model II). In line with the theoretical predictions, higher education in Norway is found to delay the time to first conception, and this is also partly true for Finland, except for the highest educational level, where the effect is estimated to be positive and significant. This is a surprising result which will be examined more closely in the future. For transitions to higher parities the educational effects are generally insignificant, but a positive effect of higher education is also estimated for Norway for transitions to parity two. This is in line with the findings for Sweden of Sz. Oláh (1996) who suggests that Swedish public policies have been successful in reducing the fertility costs for well-educated women. It could also be an income effect, if

[2] In Sweden there is an added incentive of close spacing since mothers maintain their maternal rights without going back to work, if the next child is born within 30 month (before 1986: 24 months).

these women have well-educated partners with high earnings. This is another area for future work, which will also include an analysis of the partner's income.

As discussed, work experience is left out when modelling the time to first conception as it may be jointly determined with the timing of maternity and hence endogenous to the fertility process. For transitions to higher parities, I condition on accumulated work experience at last birth, which is predetermined in relation to the current process and exogenous in that sense. The effect is estimated to be negative for both countries, but is significant only for Finland, and mainly for the risk of second conception.

5.4 Fertility price indicators

Model II includes indicators that are available for both countries, i.e. the length of the maternity/parental leave period and day-care coverage. The former variable vary more over time in Finland, where there have been more extensions, and the largest impact is also found for that country. The estimates are positive for all transitions, and are significant for first conception if cohort is excluded from the covariates (Model III) as well as for third conception regardless of model choice. For Norway the effect is also estimated to be positive for most parities, and is significant for the risk of second conception in Model III.

In line with previous analyses (Kravdal 1996, Klevmarken and Tasiran 1996), the effect of public day-care is estimated to be negative in most transitions, which is contrary to expectations. Since Kravdal's analysis of Norway is based on the same data set as the present analysis, this is hardly surprising, but shows that the result holds even if the model formulation is different and more price indicators are included among the covariates. The negative effect declines with parity and turns positive, but not significant, for the risk of third conception in Norway. When categorizing the supply variable, Kravdal finds a significant positive effect on the third-birth probability at low coverage levels. Further, interaction effects indicate that better educated women may have responded more strongly to the day-care expansion. For Finland the only available supply indicator is day-care coverage at the national level, which is strongly time-trended, and may be a poor indicator of the local supply. The results seem to confirm this notion, as the effect is estimated to be negative and strongly significant, except for transitions to parity two. More attention will be given to these issues in future work.

For Norway, other fertility price indicators are also available, among which the woman's wage is the most important. The existing empirical evidence of the effect of female wages on the fertility process is still scant, since data on individual life-cycle wages have been missing. In stead, researchers have constructed individual life-cycle wage profiles based on shorter or longer series of macro data. This is the approach taken by for example Barmby and Cigno (1990) in an analysis based on British data and also by Heckman and Walker (1990) in their study of Swedish female cohorts. Barmby and Cigno use net relative female/male wages, and find that a rise in the average female wage rate holding male wages constant, lengthens the expected time to first birth. Heckman and Walker report large and highly significant negative wage effects for all transitions (parities one, two and three) and all cohorts. Tasiran (1994) has questioned the robustness of Heckman and Walker's results by re-estimating their model with inputs from other wage series based on a combination of macro and micro data. His conclusion is that the wage effect is sensitive to the choice of wage series, and that the effect may be much weaker than suggested by Heckman and Walker (see Arroyo and Zhang 1997 for a summary of the discussion).

Clearly, there is a need for more studies based on individual wage series. One such previous study is Groot and Pott-Buter (1992), but their analysis is limited to the timing of first birth. However, their results confirm that higher female wages significantly delay maternity. This conclusion is further supported by the evidence of the present analysis, which is based on high-quality income information from administrative registers. The estimated wage effects are negative and significant for all transitions, except to parity three, mainly because of a smaller sample size.

The last price indicator examined for Norway is child benefits, which vary with calendar period and parity, but not across individuals. It is not significant in any transition, and does not seem to have had any impact on the risk of conception.

6. Conclusions

This paper has analyzed the determinants of the fertility process in two Nordic welfare states, Finland and Norway, focusing especially on the importance of economic factors, including public policies. The Nordic countries are well suited for such analysis, since they have a long tradition of generous social policies in connection with childbearing and childrearing. Previously, studies of the various components of fertility cost and their importance for the timing and spacing of births have appeared from Sweden (e.g. Heckman and Walker 1990, Tasiran 1994, Walker 1995; Klevmarken and Tasiran 1996). The present analysis complements these analyses with evidence from Finland and Norway, based on more recent data sets, which for Norway also include high quality register information on individual income.

The results so far suggest that a variety of factors should be taken into consideration when modelling the fertility process. Fertility preferences are formed by the socio-economic status and the family size of the parental home during adolescence, and are expressed through own religiousity, union formation and marital status. The individual's own educational attainment seems to be most important for the timing of first birth, which is significantly delayed by well-educated women. However, the risk of a second or third birth may even be positively asscociated with educational level. Negative effects of past work-experience is found only for Finland.

This study confirms that the economic environment is important for the timing of births. A higher female wage delays the time to first birth, and also reduces the likelihood of a second or third conception. The estimated negative effects are, however, smaller than those reported by Heckman and Walker for Sweden, based on a macro series of average wages. Further, there are indications that the extension of maternity leave has had a positive impact on fertility, especially for higher order births. The estimated negative effect of public day-care is confusing, but has also been observed in previous research (e.g. Klevmarken and Tasiran 1996). The variable is, however, strongly related to the growth in female employment, and could reflect a general atmosphere of stronger work commitment among women, which may have affected work and fertility preferences in ways that are are not fully accounted for by individual characteristics. A high coverage rate could in fact also result from a high unmet demand, since day-care spaces have always been rationed in Finland and Norway during the studied period. These are matters that will be adressed more fully in future work.

Future work will also examine more closely the importance of individual and state specific unobserved heterogeneity, which is not controlled for in this study, and test the fit of other parametric and non-parametric hazards models.

References

Arroyo CR and J Zhang (1997). «Dynamic microeconomic models of fertility choice: A survey», *Journal of Population Economics* 10:3-22.

Barmby T and Cigno A (1990). «A sequential probability model of fertility patterns», *Journal of Population Economics* 3:31-51.

Groot W and Pott-Buter H (1992). «The timing of maternity in the Netherlands», *Journal of Population Economics* 5:155-172.

Heckman JJ and Walker JR (1990). «The third birth in Sweden», *Journal of Population Economics* 3:235-275.

Ilmakunnas S (1997) «Public Policy and Childcare Choice», in: I. Persson and C. Jonung, eds., Economics of Family and Family Policy, London: Routledge, 1997.

Kiernan KE (1995). «Transition to Parenthood: Young Mothers, Young Fathers - Associated factors and later life experiences», Discussion Paper WSP/113, London School of Economics.

Klevmarken NA and Tasiran AC (1996). «Is the decision 'to work' endogenous to the fertility process?», Paper presented to the 10th Annual Conference of European Society for Population Economics (ESPE), Uppsala, June 13-15.

Kravdal Ø (1992). «The emergence of a positive relationship between education and third birth rates in Norway with supportive evidence from the United States», *Population Studies* 46, 459-475.

Kravdal Ø (1996). «How the local supply of day-care centers influences fertility in Norway: A parity-specific approach, *Population Research and Policy Review* 15:201-218.

Lesthaege R and G Moors (1995). «Is there a new conservatism that will bring back the old family? Ideational trends and the stages of family formation in Germany, France, Belgium and the Netherlands, 1981-1990», in: Evolution or Revolution in European Population, Plenary Vol., European Population Conference, Milan: FrancoAngeli.

Nordic Council of Ministers (1995). Yearbook of Nordic Statistics.

Rønsen M (1992). "Norwegian women's labour force participation one year after first birth", Working Papers 4/1992, Social Statistics, Statistics Norway.

Rønsen M and M Sundström (1996). «Maternal Employment in Scandinavia. A Comparison of the After-Birth Employment Activity of Norwegian and Swedish Women, *Journal of Population Economics* 9, 267-85.

Rønsen M and M Sundström (1997). "The Choice between Full-time and Part-time Work for Norwegian and Swedish Mothers", in: I. Persson and C. Jonung, eds., Economics of Family and Family Policy, London: Routledge, 1997.

Social Insurance Institution (1994). Statistical Yearbook of the Social Insurance Institution, Finland, T1:30.

Sz. Oláh L (1996). «The impact of Public Policies on the Second-Birth Rates in Sweden: a Gender Perspective», *Stockholm Research Reports in Demography* No.98.

Tasiran AC (1994). «Wage and income effects on the timing and spacing of births in Sweden and the United States», Doctoral dissertation, Department of Economics, Gothenburg University.

Walker JR (1995). «The effect of public policies on recent Swedish fertility behavior», *Journal of Population Economics* 8:223-251.

Table 1. Descriptive statistics analysis sample -Time constant covariates

	Finland			Norway		
	Transition			Transision		
	0→1	1→2	2→3	0→1	1→2	2→3
Birth cohort:						
1943-47 (F) / 1945 (N)	19.2	24.1	26.4	16.6	21.6	25.8
1948-52 / 1950	19.8	24.7	25.6	19.0	24.0	28.5
1953-57 / 1955	21.5	25.2	26.7	20.9	24.5	26.4
1958-62 / 1960	19.7	18.0	15.9	22.4	20.6	16.3
1963-67 / 1965	19.8	8.0	5.4	21.1	9.3	2.9
Social background:						
Manual worker	37.5	38.7	38.1	44.8	47.6	48.0
Lower+middle employee	15.0	13.3	13.1	21.2	18.9	17.2
Upper employee	8.5	6.5	6.8	16.4	14.2	13.9
Farmer+Selfempl.+Others	39.0	41.5	42.1	17.7	19.3	21.0
No. of siblings	2.9	3.1	3.2	2.5	2.6	2.6
Religious convinction (F) /activity (N):						
Believer / High	10.1	9.4	11.8	11.7	11.1	14.5
Other / Low	89.9	90.6	88.2	88.3	88.9	85.5
Marital status at last birth:						
Directly married		41.7	51.0		47.0	61.7
Married after cohab.		39.5	43.2		26.5	33.2
Cohabiting		11.4	5.8		14.6	5.2
Single		7.5	excl.		11.8	excl.
Age at last birth		24.1	27.0		23.3	26.2
Interbirth interval (years)			3.6			3.5
Education at last birth						
≤ 9 years		32.3	31.1		22.3	22.6
10 years		31.6	32.1		41.6	42.5
11-12 years		26.9	25.2		18.7	16.1
> 12 years		9.3	11.5		17.4	18.8
Work exp. at last birth (full-time eq. years)		4.7	6.2		4.1	5.1
Hourly wage at last birth (1990 NOK)		n.a.	n.a.		71.20	78.60
Mean duration (months)	124.6	46.6	67.5	111.8	40.5	65.6
- events	104.4	31.6	41.3	95.3	31.3	38.1
- non-events, incl. censored	169.2	78.4	79.7	153.2	62.3	80.0
No. of women	3639	2511	1715	3296	2355	1630

n.a.: not available

Table 2. Relative risks of *first* conception. Women born 1943-67.

	Finland			Norway		
	(I)	(II)	(III)	(I)	(II)	(III)
Birth cohort:						
1943-47 (F) / 1945 (N)	1.[a]	1.		1.	1.	
1948-52 / 1950	0.93	1.02		1.01	1.05	
1953-57 / 1955	0.85**	1.10		0.88*	1.00	
1958-62 / 1960	0.72***	1.12		0.74***	0.92	
1963-67 / 1965	0.49***	0.90		0.57***	0.75*	
Social background:						
Manual worker	1.27***	1.29***	1.29***	1.13*	1.17**	1.17**
Lower+middle employee	0.96	0.98	0.98	0.92	0.99	1.00
Upper employee	0.77**	0.82*	0.82*	0.81**	0.88(*)	0.88(*)
Farmer+Selfempl.+Others	1.	1.	1.	1.	1.	1.
No. of siblings	1.06***	1.05***	1.06***	1.04***	1.04***	1.04***
Religious convinction (F)/activity (N):						
Believer / High	0.80***	0.79***	0.78***	0.79***	0.79***	0.78***
Other / Low	1.	1.	1.	1.	1.	1.
Current education:						
≤ 9 years	1.	1.	1.	1.	1.	1.
10 years	1.06	1.04	1.04	0.82***	0.83***	0.85**
11-12 years	0.81***	0.82***	0.81***	0.51***	0.52***	0.56***
> 12 years	1.29**	1.31**	1.31**	0.65***	0.68***	0.79*
Maternal (parental) leave[b]:		1.03	1.05*		0.92	1.04
Day-care coverage[c]:		0.79**	0.76***		0.87***	0.88***
Child benefits (1000 NOK/year)[d]			n.a.			0.97
Hourly wage (10 NOK)[d]			n.a.			0.94*
-2 Log Likelihood	304.5	346.2	336.3	335.4	377.4	382.1
DF	12	17[e]	13[e]	12	18[e]	16[e]
No. of women		3639			3296	
No. of events		2506			2314	

[a] Reference category. [b] Finland: months (continuous variable). Norway: 12 weeks (reference group) and 18-22 weeks. [c] No. of spaces per 10 children aged 0-6 (F)/0-3 (N). [d] 1990 prices. [e] This model also contains regional dummies which are mainly of national interest. n.a. = not available

*** significant at the 1% level, ** at 5%, * at 10%.

Table 3. Relative risks of *second* conception. Women born 1943-67.

	Finland			Norway		
	(I)	(II)	(III)	(I)	(II)	(III)
Birth cohort:						
1943-47 (F) / 1945 (N)	1.[a]	1.		1.	1.	
1948-52 / 1950	0.96	0.88		0.87*	0.82**	
1953-57 / 1955	1.21*	1.00		0.83*	0.75**	
1958-62 / 1960	1.29**	1.02		0.75***	0.66**	
1963-67 / 1965	1.46**	1.10		0.44***	0.38***	
Social background:						
Manual worker	0.93	0.94	0.94	0.84**	0.86*	0.86*
Lower+middle employee	0.97	0.98	0.99	0.80**	0.83*	0.83*
Upper employee	1.18	1.22(*)	1.22(*)	0.83**	0.89	0.91
Farmer+Selfempl.+Others	1.	1.	1.	1.	1.	1.
No. of siblings	1.01	1.00	1.00	1.04**	1.04**	1.04**
Religious convinction (F) / activity (N):						
Believer / High	1.47***	1.46***	1.46***	1.60***	1.58***	1.58***
Other / Low	1.	1.	1.	1.	1.	1.
Marital status at 1st birth:						
Directly married	1.	1.	1.	1.	1.	1.
Married after cohab.	0.87*	0.87*	0.87*	0.98	0.99	0.98
Cohabiting	0.63***	0.64***	0.64***	0.65***	0.67***	0.65***
Single	0.60***	0.59***	0.59***	0.49***	0.49***	0.48***
Age at 1st birth	1.25***	1.24**	1.24**	1.09	1.10	1.23**
Age^2/10	0.96***	0.96***	0.96***	0.97(*)	0.97*	0.96**
Education at 1st birth:						
≤ 9 years	1.	1.	1.	1.	1.	1.
10 years	0.97	0.95	0.95	1.10	1.07	1.12
11-12 years	0.92	0.91	0.91	1.00	1.02	1.13
> 12 years	1.14	1.13	1.13	1.36**	1.37**	1.74***
Work exp. at 1st birth	0.95***	0.96***	0.96**	0.99	0.99	0.99
Maternal (parental) leave[b]:		1.05	1.03		1.15	1.22*
Day-care coverage[c]:		0.98	1.03		0.94(*)	0.93(*)
Child benefits (1000 NOK/year)[d]			n.a.			0.99
Hourly wage (10 NOK)[d]			n.a.			0.89**
-2 Log Likelihood	177.7	192.1	186.8	286.1	317.7	307.7
DF	18	23[e]	19[e]	18	24[e]	22[e]
No. of women		2511			2355	
No. of events		1711			1641	

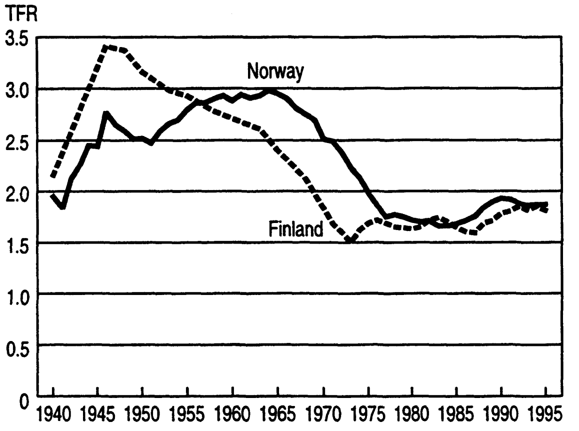
Footnotes: See table 2.

Table 4. Relative risks of *third* conception. Women born 1943-67[1].

	Finland			Norway		
	(I)	(II)	(III)	(I)	(II)	(III)
Birth cohort:						
1943-47 (F) / 1945 (N)	1.[a]	1.		1.	1.	
1948-52 / 1950	1.28*	1.63**		0.77*	0.71**	
1953-57 / 1955	1.54***	2.64***		0.86	0.74(*)	
1958-67 / 1960+1965	1.24	3.10***		0.75(*)	0.61*	
Social background:						
Manual worker	1.03	1.06	1.07	0.88	0.87	0.87
Lower+middle employee	0.92	0.91	0.94	0.92	0.91	0.91
Upper employee	1.15	1.18	1.21	0.87	0.88	0.89
Farmer+Selfempl.+Others	1.	1.	1.	.	1.	1.
No. of siblings	1.03(*)	1.02	1.03	1.07***	1.07**	1.07**
Religious convinction (F) /activity (N):						
Believer / High	1.68***	1.62***	1.64***	1.98***	1.98***	1.96***
Other / Low	1.	1.	1.	1.	1.	1.
Marital status at 2nd birth:						
Directly married	1.	1.	1.	1.	1.	1.
Married after cohab.	0.91	0.95	0.98	0.90	0.94	0.93
Cohabiting	0.88	0.97	0.97	1.44	1.45	1.43
Age at 2nd birth	0.91	0.93	0.93	0.96	0.96	1.04
$Age^2/10$	1.01	1.02	1.01	1.00	0.99	0.99
Interbirth interval (years)	0.90***	0.90***	0.90***	0.85***	0.85***	0.85***
Education:						
≤ 9 years	1.	1.	1.	1.	1.	1.
10 years	0.91	0.91	0.90	0.92	0.90	0.95
11-12 years	0.82	0.84	0.82	0.89	0.87	0.99
> 12 years	0.96	0.96	0.94	1.10	1.08	1.43
Work exp. at 2nd birth	0.97(*)	0.96(*)	0.96(*)	0.98	0.97	0.98
Maternal (parental) leave[b]:		1.15**	1.16**		1.15	1.13
Day-care coverage[c]:		0.55***	0.76*		1.04	1.02
Child benefits (1000 NOK/year)[d]			n.a.			1.01
Hourly wage (10 NOK)[d]			n.a.			0.89
-2 Log Likelihood	27.2	155.5	142.4	193.3	200.4	196.1
DF	17	22[e]	19[e]	17	23[e]	22[e]
No. of women		1715			1630	
No. of events		547			559	

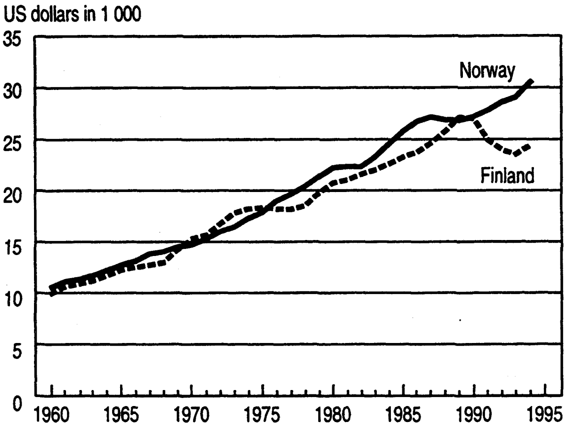
[1] Women who were single at 2nd birth are excluded. Other footnotes: see table 1.

Figure 1. Total fertility rate. 1940-1994



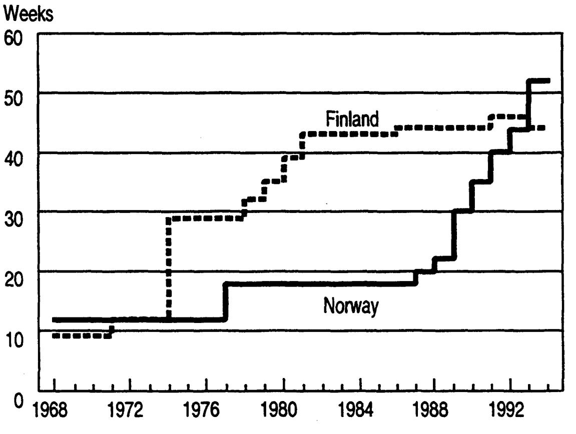
Sources: Norway: Brunborg and Mamelund, Reports 94/27, Statistics Norway; Finland: Statistical yearbook, various editions

Figure 2. Gross domestic product per head. 1960-1994. 1990 US dollars



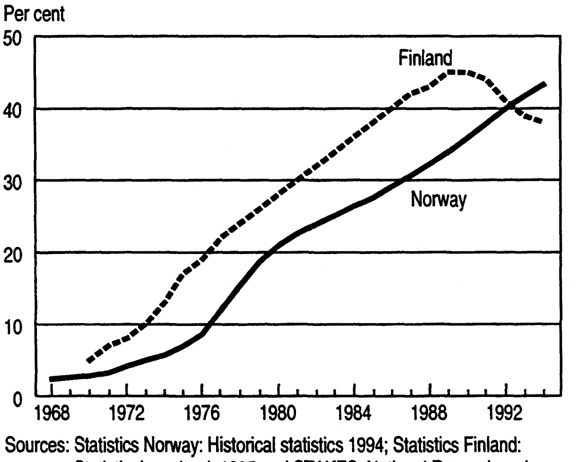
Source: OECD "National Accounts". Main aggregates, Vol. 1, 1960-1994

Figure 3. Length of paid maternity leave. 1968-1994



Sources: Norway: L. Hansen, Interne notater 91/17, Statistics Norway 1991 and Ministry of Children and Family Affairs; Finland: Ministry of Social Affairs and Health

Figure 4. Child care spaces per 100 children aged 0-6. 1968-1994



Sources: Statistics Norway: Historical statistics 1994; Statistics Finland: Statistical yearbook 1995 and STAKES, National Reseach and Development Centre for Welfare and Health

Recent publications in the series Documents

96/21 P.J. Bjerve: Contributions of Ragnar Frisch to National Accounting

96/22 N.M. Stølen: Effects on Wages from Changes in Pay-roll Taxes in Norway

96/23 O. Ljones: Building Confidence in Statistics. Reliable Statistics in Market Economy Countries

96/24 Å. Kaurin, E. Vinju and L. Solheim: Statistics on Waste and Recycling from Parts of the Public Sector

96/25 T. Bye and S. Kverndokk: Nordic Negotiations on CO_2 Emissions Reduction. The Norwegian Negotiation Team's Considerations

96/26 L. Rogstad and M. Dysterud: Land Use Statistics for Urban Agglomerations. Development of a Method Based on the Use of Geographical Information Systems (GIS) and Administrative Records

96/27 K. Rypdal: NOSE – Nomenclature for Sources of Emissions

97/1 T.C. Mykkelbost and K. Rypdal: Material Flow Analysis of Cadmium and Di-2-etylhexylphthalate (DEHP) in Norway

97/2 S. Grepperud: The Impact of Policy on Farm Conservation Incentives in Developing countries: What can be Learned from Theory

97/3 M. Rolland: Military Expenditure in Norway's Main Partner Countries for Development Assistance. Revised and Expanded Version

97/4 N. Keilman: The Accuracy of the United Nation's World Population Projections

97/5 H.V. Sæbø: Managerial Issues of Information Technology in Statistics Norway

97/6 E.J. Fløttum, F. Foyn, T.J. Klette, P.Ø. Kolbjørnsen, S. Longva and J.E. Lystad: What Do the Statisticians Know about the Information Society and the Emerging User Needs for New Statistics?

97/7 A. Bråten: Technical Assistance on the Jordanian Consumer Price Index

97/8 H. Brunborg and E. Aurbakken: Evaluation of Systems for Registration and Identification of Persons in Mozambique

97/9 H. Berby and Y. Bergstrøm: Development of a Demonstration Data Base for Business Register Management. An Example of a Statistical Business Register According to the Regulation and Recommendations of the European Union

97/10 E. Holmøy: Is there Something Rotten in this State of Benchmark? A Note on the Ability of Numerical Models to Capture Welfare Effects due to Existing Tax Wedges

97/11 S. Blom: Residential Consentration among Immigrants in Oslo

97/12 Ø. Hagen and H.K. Østereng: Inter-Baltic Working Group Meeting in Bodø 3-6 August 1997 Foreign Trade Statistics

97/13 B. Bye and E. Holmøy: Household Behaviour in the MSG-6 Model

97/14 E. Berg, E. Canon and Y. Smeers: Modelling Strategic Investment in the European Natural Gas Market

97/15 A. Bråten: Data Editing with Artificial Neural Networks

98/1 A. Laihonen, I. Thomsen, E. Vassenden and B. Laberg: Final Report from the Development Project in the EEA: Reducing Costs of Censuses through use of Administrative Registers

98/2 F. Brunvoll: A Review of the Report "Environment Statistics in China"

98/3: S. Holtskog: Residential Consumption of Bioenergy in China. A Literature Study

98/4 B.K. Wold: Supply Response in a Gender-Perspective, The Case of Structural Adjustments in Zambia. Tecnical Appendices

98/5 J. Epland: Towards a register-based income statistics. The construction of the Norwegian Income Register

98/6 R. Chodhury: The Selection Model of Saudi Arabia. Revised Version 1998

98/7 A.B. Dahle, J. Thomasen and H.K. Østereng (eds.): The Mirror Statistics Exercise between the Nordic Countries 1995

98/8 H. Berby: A Demonstration Data Base for Business Register Management. A data base covering Statistical Units according to the Regulation of the European Union and Units of Administrative Registers

98/9 R. Kjeldstad: Single Parents in the Norwegian Labour Market. A changing Scene?

98/10 H. Brüngger and S. Longva: International Principles Governing Official Statistics at the National Level: are they Relevant for the Statistical Work of International Organisations as well?

98/11 H.V. Sæbø and S. Longva: Guidelines for Statistical Metadata on the Internet

98/12 M. Rønsen: Fertility and Public Policies - Evidence from Norway and Finland

Documents

PORTO BETALT
VED
INNLEVERINGA
P.P.
NORGE/NOREG

Tillatelse nr.
159 000/502

B

Returadresse:
Statistisk sentralbyrå
Postboks 8131 Dep.
N-0033 Oslo

Statistics Norway
P.O.B. 8131 Dep.
N-0033 Oslo

Tel: +47-22 86 45 00
Fax: +47-22 86 49 73

ISSN 0805-9411

Statistisk sentralbyrå
Statistics Norway