

# The Effect of a Regional Tax and Family Benefit Reform on Fertility in the Norwegian Arctic\*

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Taryn Ann Galloway <sup>1</sup> and Rannveig V. Kaldager <sup>2</sup>

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PRELIMINARY AND INCOMPLETE. PLEASE TO NOT CITE OR QUOTE.

## 1 Objective

As Hotz et al. (1997) noted in their survey on the economics of fertility, one of the main challenges when attempting to study how economic factors influence fertility is to find “plausibly exogenous variation” in economic variables (such as prices and income)<sup>3</sup>. Moderately large and/or discrete changes in the family-related tax and benefits policies in place in many countries throughout the world are strong candidates for sources of exogenous variation in economic circumstances, but even up until the current day very few studies have been able to uncover and adequately analyze such changes. Whittington et al. (1990) and Whittington (1992) study variation in tax deductions for children in the US tax code to uncover the extent to which such tax policies influence fertility. More recently, Milligan (2005) studies the introduction of generous birth-related benefits introduced in Quebec in the late 1980s and finds a quite profound effect on fertility in the province. In exploiting temporal variation in the form and amount of benefits to families in Israel, Cohen et al. (2007) also sheds light on the extent to which fertility is influenced by economic factors. Equipped with detailed, high quality comprehensive data for the entire population of Norway, we are able to contribute to this small, but valuable literature by rigorously analyzing the effect on fertility

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<sup>1</sup>Research Department, Statistics Norway, PB 8131 Dep., N-0033 Oslo, Norway, email: tag@ssb.no

<sup>2</sup>Research Department, Statistics Norway, PB 8131 Dep., N-0033 Oslo, Norway and University of Oslo, Norway, email: rvk@ssb.no

<sup>3</sup>See also Gauthier (2007)

of a regional public policy reform package which dramatically altered the economic circumstances faced by families in the far north of Norway.

## 2 Description of the regional reforms

The reform package studied in this paper was introduced in the period 1988-1990 and changed the budget constraint (economic circumstances) of families in the northernmost parts of Norway (Finnmark and North Troms) relative to similar families in the rest of the country. The first reform, introduced 1 January 1988, allowed a person to reduce his/her (public) student loans by 10% (up to a limit of NOK 15.000) for each year having lived and worked in the region. The second reform, introduced 1 January 1989, provided extra (universal) child benefits to families in the region, in addition to the general benefits enjoyed by all families in Norway. Neither the general child benefits (for the whole country), nor the additional benefits introduced for Finnmark and North Troms are means-tested. The additional child benefits initially amounted to NOK 2400<sup>4</sup> per year, but were quickly raised by 50% to NOK 3600 in 1990. The final reform, implemented 1 February 1990, introduced income tax breaks for all taxpayers in the region as well as exemptions from (otherwise mandatory) employer contributions to the national social security system for (private sector) companies<sup>5</sup>.

## 3 Methods and Data

### 3.1 Data

From various register sources, we have information on date of birth (for both mothers and children), place of residence (municipality) as of the 1st of January each year, number and age of previous children, and educational achievement and participation for the full population of Norway in the relevant period. By subtracting average length of pregnancy from date of birth, we construct a measure for date of conception (leading to a live birth). Information on marital status and yearly pensionable earnings was available, but is omitted due to possible endogeneity problems.

### 3.2 Descriptive results

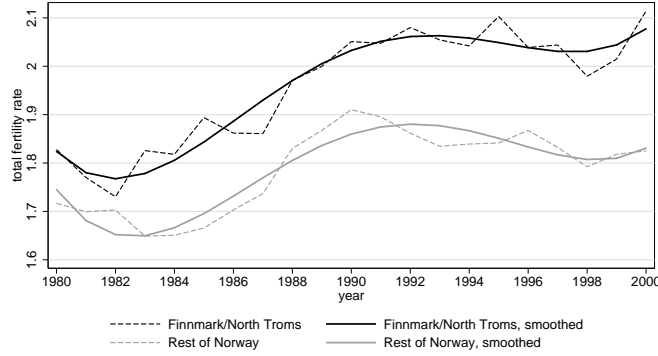
As figure 1 documents, the total fertility rate in Finnmark/North Troms (FNT) fluctuated in much the same manner as the rest of the country in the period 1980-2000. The trend for Finnmark/North Troms ran roughly parallel to the trend for the rest of the country up until the end of the 1980s. In the late 1980s and early 1990s, i.e. at approximately the same time as the introduction of the reforms we will study,

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<sup>4</sup>Using OECD purchasing power parity data for private consumption in 1989 (9.85 NOK/USD) this amounts to roughly \$244 (in 1989 dollars).

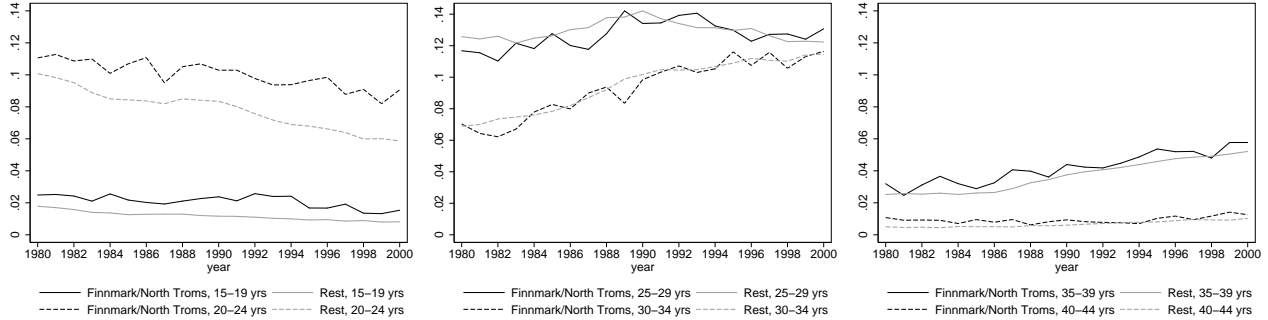
<sup>5</sup>Prior to 1990, individual taxpayers in the region had enjoyed a slightly higher general tax deduction than taxpayers in the rest of the country, but the 1990 increased those tax breaks/deductions considerably. See <http://www.regjeringen.no/en/dep/krd/Subjects/rural-and-regional-policy/virkeomrader-retningslinjer-og-regler/action-zone-in-finnmark-and-nord-troms.html?id=527171>

Figure 1: Total fertility rates in Norway by reform region. 1980-2000.



Notes: Because of the relatively small population size in FNT, trends for that region in particular are far from smooth. We therefore include smoothed trend lines, constructed by means of a linear regression of the total fertility rate on a fourth order polynomial of time since 1980.

Figure 2: Age-specific fertility rates for selected age groups in Norway by region. 1980-2000.



the trends in the two regions did diverge somewhat. The basic descriptive results on TFR thus give the impression that the reforms may indeed have had an effect on fertility behavior in the far north of Norway.

Figure 2 shows the trends in age specific fertility rates (ASFR) for Finnmark and North Tros and the rest of the country. Here, no clear increase in fertility at the time of the reform in Finnmark and North Tros is discernable. The divergence between these figures and figure 1 may indicate that what appeared to be a possible reform effect in figure 1, instead are regional differences in fertility driven by region-specific changes in the age composition.

### 3.3 Preliminary multivariate results

To further investigate if the reform affects fertility, we proceed to multivariate analysis of individual data. The starting point for our analysis is a difference-in-difference (DD) framework (see e.g. Angrist and Pischke (2009)), and we aim to investigate if the change in fertility in Finnmark and North Tros from before to after the reform was greater than the concurrent change in fertility in the rest of Norway.

We estimate our multivariate model in three specifications, all of which are linear probability models with the yearly probability of conception (leading to a live birth) as the dependent variable. All models include controls for a age, captured by means of six indicator variables for five-year age groups. In our

first specification, we include year- and region fixed effects. Here, the main identifying assumption is that trends in fertility over time would have been the same in the reform and non-reform region absent the reform. This identifying assumption does not hold if the general trend in (overall) fertility is made up of very different underlying trends in age-specific fertility rates. Figure 2 show that while ASFR for the youngest age groups were falling, fertility rates were rising (at different paces) for other ages. To account for these different trends, we model the trend in each ASFR separately in our second specification. Given that ASFRs in Norway at the time (Figure 2) appear to be largely linear in nature, we specify linear ASFR trends. We accommodate the possible non-linearity in the trend for the 25-29 age group with an additional quadratic term. In our third specification, we specify one set of ASFR trends for the reform region and another for the rest of the country. (We continue to use the quadratic specification for the 25-29 age group.) In doing so, we loosen up the strong identifying assumption that trends in Finnmark/North Troms would have been the same (in the absence of the reform) as the trends in the rest of the country and replace it by an assumption that the trends in ASFR are correctly specified for both the reform region and the rest of the country.

Preliminary multivariate results (not shown) in all three specifications indicate that the reform did not have the (theoretically) expected positive effect on fertility. Further robustness checks and alternative analysis are also unable to document an effect of this reform, despite estimates with good precision. Our results therefore run counter to many previously published works by suggesting that there is no positive effect on fertility behavior from an exogenous increase in economic resources.

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