Cash for Care Reform in Norway:
A Natural Experiment for the Effectiveness of Pro Natalist Policies.

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Abstract:
This paper exploits the introduction of the Cash for Care (CFC) reform in Norway which overhauled the country's system of subsidized daycare. I utilize a difference in differences strategy using municipal birth registers in both Norway and Denmark to study the fertility effects of the CFC reform, and thus also the fertility effects of subsidizing childbirth. I find evidence of an increase in fertility resulting from the reform, and also that this increase is greater for municipalities with poor access to publicly subsidized daycare.

Section I: Introduction

Pro-natalist policies are government sponsored programs to increase the natural rate of population growth. Many nations depend on an expanding population, and thus workforce in order to sustain their political/military influence or to maintain domestic programs. For example, Seitz and Kempkes (2007) show that the demographic change resulting from declining fertility and rising life expectancies in Germany would result in significant expenditure imbalances between the federal and state governments, and Anderson (2007) show how the demographic shift resulting from declining birthrates in Scandinavia threatens the financial viability of the Scandinavian welfare state. Pro-natalist policies are often what governments turn to after easier means of expanding the workforce, such as putting women in the work force or immigration, have failed or are otherwise judged inadvisable.

The recent history of pro-natalist policies has generally fallen into three categories. First, there are the policies that involve increasing the perceived or actual value of children, through propaganda or through encouraging a "culture of fecundity" by praising high birthrates and shaming low. Examples include the population growth initiatives undertaken by Eastern Bloc countries during the Cold War and the massive government ad campaign for greater fertility in Singapore. Next, there are the policies that reduce the opportunity cost for childcare, by providing services such as daycare and

preschool, or mandatory paid maternity leave or mandating employers hold jobs open for women leaving for said maternity leave. Most OECD nations have these policies in place in one form or another. Finally, there are the policies that outright subsidize childbirth, with a straightforward cash payment for each birth, either in lump sum, or over a period of time, or in the form of tax-benefits. Policies of this nature are relatively rare, with Singapore and the Canadian province of Quebec before 1997 being good examples. Whether any of these policies work, or which policies work best is a matter of much debate.

Declining Fertility in Western Europe
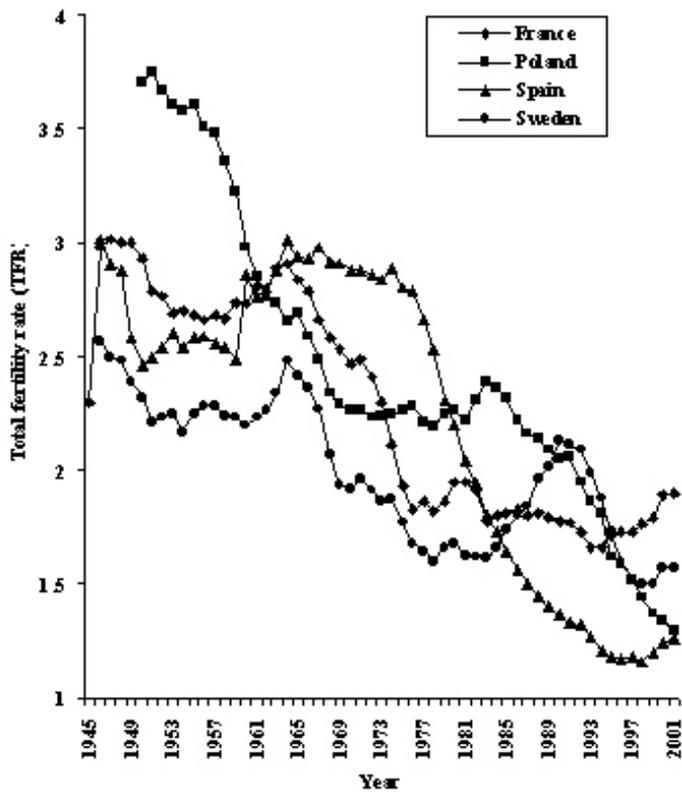
Beginning in August 1998 and extending into early 1999, Norway instituted what it called the Cash for Care Reform or CFC. It was a part of Norway's unusually generous

system of maternity and paternity benefits, which include among other things, extended periods of paid maternity and paternity leave, child supplements, tax benefits, and a system of subsidized daycare, all of which can be understood to be pronatalist in either subsidizing childcare or childbirth. In particular, the CFC reform affects Norway's system of universal daycare. The system was designed to encourage gender equality by heavily subsidizing daycare for women of pre-school-age children to the tune of approximately ½ of total costs being born by the Norwegian national government. (OECD 2002) A secondary purpose was the belief that children socialized in a public environment are healthier than those raised at home. As such, the eventual goal was 100% usage of public daycare. While much progress had been made toward this goal, it was still incomplete at the time of the CFC reform. (and remains incomplete today)

Figure 1.1: Usage of Public Daycare prior to CFC reform
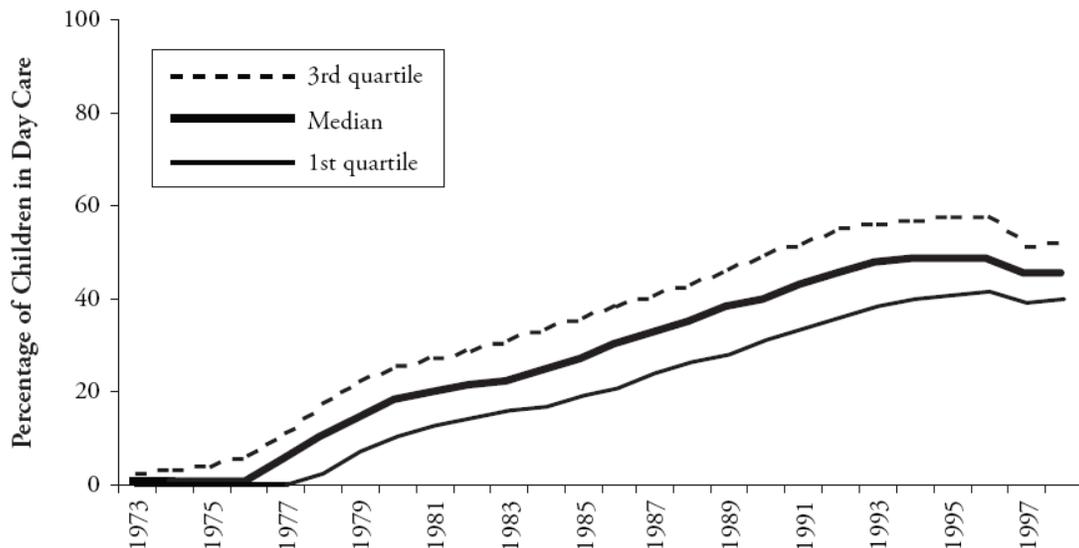
Source: Statistics Norway 2002

Additional subsidies are occasionally offered by a municipal or county government. Although individual daycare centers are maintained both by municipal governments and private groups, the quality of public daycare across Norway when available, is mostly even due to extremely high centrally mandated requirements for registering a daycare center.

As figure 1.2 from Statistics Norway shows, Norwegian parents prefer public daycare to any other form of childcare for preschool-age children, but there is chronic under-provision of daycare leading to many who would otherwise prefer public daycare relying on other means of childcare. (Statistics Norway 2007) This under-provision is considerably more serious in non-urban municipalities.

Figure 1.2: Preferred childcare options
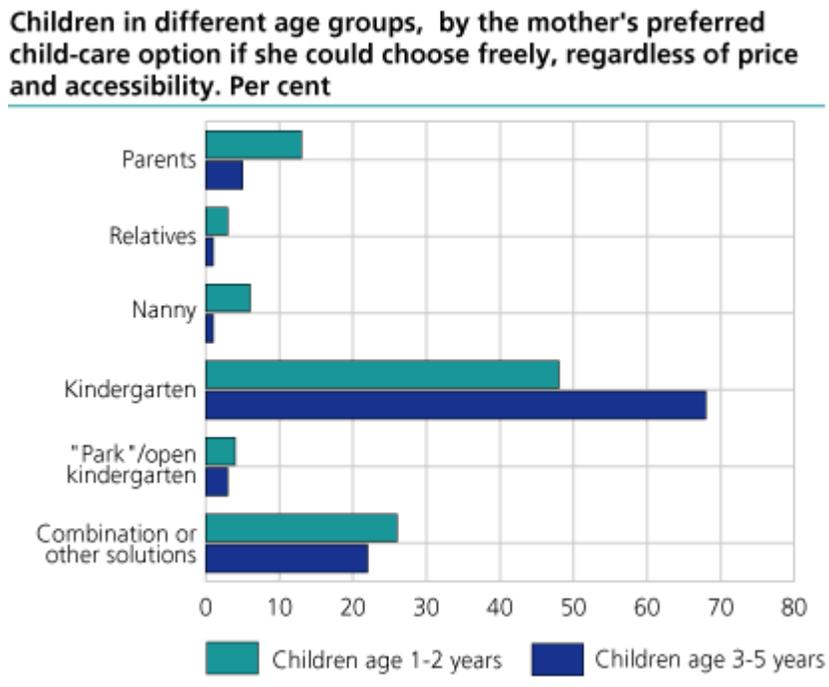
Source: Statistics Norway 2002

The CFC reform was partly implemented in response to this under-provision. The stated purpose of the reform was 1) to distribute more equally public transfers, 2) to motivate parents to spend more time with their children, and 3) to increase flexibility with regard to parent's choice of childcare. (Naz 2003)

The CFC reform specifically applies to parents who do not take advantage of state subsidized daycare. For parents of children aged 1 and 2, the reform provides a monthly cash subsidy equal to the amount the state would have subsidized daycare had the child been enrolled in public daycare, provided the parents match the eligibility requirements. The subsidy was initially a flat sum of 2250 kroner per month, later raised to 3000 kroner per month. The requirements are that the child in question cannot be enrolled full time in state subsidized daycare, and the parents must have resided in Norway for a minimum of 3 months. The full amount of the subsidy is paid to parents of children not at all enrolled in subsidized daycare, while a lesser sliding amount is paid to parents of children enrolled only part-time.

Figure 1.3: Sliding scale of payments for CFC subsidy

Time per week in the day care	Cash benefits per month
No day care	3000
1–8 hours	2400
9–6 hours	1800
17–24 hours	1200
25–32 hours	600
> 32 hours	0

Source: Social Office, Norway.

In essence, the reform can be understood as changing Norway's existing system of subsidized childcare into an outright birth subsidy, as the previous state subsidy for public childcare can now be received regardless of whether public childcare is actually

used. The introduction of CFC reform allows for a natural experiment approach to investigating the effects of the switchover from a subsidy for childcare to an outright subsidy for childbirth.

The singular nature of the reform renders it susceptible to a difference in differences study. In particular, I will use the DD approach in two ways to look at the fertility effects of the reform. First, Denmark is very similar to Norway in its system of pro-natalist and maternal policies. In particular, it shares the highly generous child provisions including maternity and paternity leave as well as heavily subsidized public daycare. In addition, it is another Scandinavian nation with strong cultural, linguistic, and economic similarities to Norway. However, there were no policy changes in the Danish system of pro-natalist policies while Norway was undergoing the CFC reform. Therefore the DD approach using the difference in the differences in fertility in Denmark and Norway before and after the CFC reform can be used to gauge the effects of the reform.

Second, due to factors which remain uncertain, Norwegian culture is such that families greatly prefer public daycare over other forms of childcare even for children of very young age. This means that the binding limit on usage of public daycare generally is availability. In major urban centers, there is little or no shortage of space in the subsidized childcare centers even with 80%+ of children under age 5 enrolled in such programs, but this is not the case in rural areas. (Rindfuss et al 2007) Due to the strong preference for public daycare, the reform is likely to have little or no effect in urban centers, where parents are unlikely to switch from public daycare to some other form of childcare with the CFC subsidy. However, in rural areas, where many families are

unable to have easy access to public daycare, the subsidy acts as an entirely new cash subsidy for childbearing. Thus another avenue of approach will be use the DD method to look at differences in the effects of the reform on municipalities with and without easy access to public childcare.

Section II: Review of existing research

Economic analysis of fertility has been around since before Malthus, but most modern analysis began by putting family planning into the framework of consumer choice. The family is viewed as a consumer of children. Demand for children is dependent on price, the price of complementary goods like education and childcare, income, personal preferences, and related technologies, such as prevalence of contraception. This work was pioneered by Becker (1960), and refined by Mincer (1963). This work predicts, among other things, that all else held constant, income should positively affect fertility, and the price of children would negatively affect fertility. The latter is relatively uncontroversial and is the primary subject of research in the field.

The former has been a problem in some research dealing with welfare transfer payments, as income has seemed to be negatively related to fertility in the developed world. This was taken into consideration in Becker (1976) which broadens the conceptualization of the framework such that the household uses inputs of goods, services, and time to produce various commodities including children. The commodities can be relatively goods or time intensive, so an increase in wages may

reduce demand for children by raising the opportunity cost of children. However, the ability to substitute goods and services for time, such as day care, can counter the decrease in demand for children. Easterlin (2000) further refined this problem by including the notion of aspirations formed in childhood, reconciling the predicted income effects and that are seen empirically.

So does the Becker model hold up in reality? Taking the qualifications into consideration, a wide body of literature has sought to investigate the empirical evidence behind Becker's model. Cain and Weininger (1963), Mincer (1963), Montgomery and Trussel (1986) showed that if family income is held constant: as the price of children increased, fertility fell, and also that, if all else is held constant, income increases the demand for children. The general consensus is that the basic predictions of the Becker model hold, though there are possible exceptions. For example, Robins and Blau (1989) found using survey data from the U.S. gathered during the Carter Administration that increasing childcare costs only affected the fertility of unemployed women. Why this may be so is unexplained, so it may remain an anomaly.

Further, there may be other determinants of fertility besides income and the cost of childbearing. For example, the Easterlin study used survey data of children to study the relationship between the number of children that people anticipated having while themselves children and the number of children that they actually had. The study found that such childhood aspirations may actually provide more explanatory power than the Becker style consumer choice model. However, these childhood aspirations are likely to be based on things like religion and culture that governments have a difficult time influencing. Many governments, such as that of Singapore (Hin 2007) or the former

Soviet Union uses/used mass propaganda campaigns in an effort to increase fertility in this way. However, testing for the efficacy of such efforts is extremely difficult due to numerous confounding factors.

Efforts to find the effectiveness of government intervention through pronatalist polices cannot be easily separated into the three types of policies. Most programs incorporate all three types into a general program to increase birthrates. For example, the Singaporean program incorporates a significant propaganda campaign, multiple services including crèche care for children of working mothers and maternity leave, as well as several subsidy programs, including lump sum payments, income graded payments, and tax benefits. Some studies were done of overall pro-natalist programs without attempting to separate out the effects of individual policies.

Long before advanced Western countries became concerned enough with demographic issues to begin purposely targeted pronatalist policies, such policies had begun in the Second World, or Soviet Bloc countries. Rapid industrialization and relatively low technology and labor intensive economies both generated high labor demand and significantly reduced fertility rates as populations concentrated in the cities and women entered the work force en mass. Heitlinger (1976) studied the pronatalist policies in Czechoslovakia in the post Second World War era. Czechoslovakia, being highly industrialized, yet primitive compared to Western economies had an extreme labor shortage once women's workforce participation approached 100%. Unlike Western nations, communist bloc countries were unable to make up the labor shortage through immigration. Thus, starting in 1962, the Czech government instituted a wide array of pronatalist policies, including extended paid maternity leave, early retirement for multiple

births, and rent rebates based on number of children, coupled with heavy propaganda as well as significant restrictions on abortion. Heitlinger concluded that the strong pronatalist policies did increase fertility. However, Falkingham and Gjonca (2001) on Communist Albania, and Barbieri et al (1996) on the Soviet Republic of Uzbekistan, found that pronatalist policies had little success in influencing their demographic transition. Reflecting these results, Louzek (2003), who studied pronatalist policies in 9 countries with time series data, concluded that such policies were not very effective. The conflicted results are likely due to the general inability of studies of this sort to get at the particular effects of individual policies, especially since many have difficulty separating out the effects of changing cultural expectations on fertility which occurred at the same time, and may indeed have caused the introduction of the pronatalist programs in the first place. In the Uzbek case for example, the policies were introduced when Soviet planners saw what they perceived as an alarming decline in Russian fertility as compared to native Uzbek.

Due to lack of controls over endogeneity, studies of this sort provide limited insight into the efficacy of pro-natalist policies. However, more recent studies into package programs of this sort may be better able estimate the actual effects.
Park (2005) looked at the Singaporean Qualified Child Relief program, which included tax rebates, cash subsidies, and paid maternity leave, as well as childbirth friendly legal provisions. He found a small, but significant increase in fertility due to the program, though by its very nature, it is difficult to separate out the results of the program and the heavy pro-natalist propaganda also instituted during and before the period in question. In

general, studies into programs of this sort can judge whether programs were effective, but not what makes them effective.

Study into birth subsidies are also quite common, likely because such programs, at least hidden, are pervasive in the industrialized world. Most research in the West on the birth-subsidy type of pro-natalist policies focus on the possible pro-natalist effects of policies not actually aimed at pro-natalism. Many are social welfare policies aimed at the poor and face political difficulty regarding the possibility of increasing fertility among the poor. Boyer (1989) studied the effects of the Poor Law on fertility in England, using county registry data and the differing generosities of the Poor law, which was locally administered, particularly with regard to poor mothers. While the data is limited, in general, Boyer showed a positive influence of the Poor law on English birthrates. Studies of more recent data often focus on special tax and transfer provisions for families with children, which exist in 28 of 30 OECD countries. (OECD, 2002) These policies are generally not motivated by natalist concerns, but rather with assorted brands of equity. Peters (1990), Whittington (1990, 1993), have found evidence that fertility was responsive to the dependent exemption in the U.S. tax code, which functions as a birth subsidy by reducing tax burdens on giving birth. Similar studies by Georgellis and Wall (1992), and Gohmann and Ostfeldt (1994) obtained substantially similar results. Huang (2002), looking at the personal exemption in the tax code of Taiwan, also found a significant, but small effects on fertility.

The studies of AFDC, and similar programs aimed at single women and low income families have a far more mixed result. Hyatt and Milne (1991) found a small but positive impact on fertility from Canadian government programs that implicitly alter the

costs of having a child. Acs (1996), Fairlie and London (1997), and Rosenzweig (1999) found either no statistically significant relationship between AFDC and food stamps on childbearing decisions or a weak relationship with little robustness. Some papers, such as Francesconi and van der Klaauw (2007) who studied the Working Families Tax Credit in Britain concluded that the policy resulted in the reduction of fertility. A literature survey by Hoynes (1997) concluded there was no evidence of an effect of welfare on fertility. However, Moffitt (1998) concludes that there is a weak positive relationship. More recently: Baughman and Dickert-Conlin (2003), looking at the effects of the Earned Income Tax Credit, found a small but positive effect on fertility, with the odd caveat that the effect was only significant for nonwhite women.

These confused results are likely due to the specialized circumstances of the people targeted by AFDC and the like. For example, Francesconi and van der Klaauw's study specifically focused on the effects of the WFTC on lone mothers. Many of the people affected by the AFDC were also lone mothers. The sample thus tends to be quite young, poor, and with low levels of education. As a group, their births are often unplanned and thus unlikely to be affected by pronatalist policies which by their nature influence the planned childbearing decision. As such, studies looking at this restricted sample may not be fully reflective of the effectiveness of pro-natalist policies in general, as the population under study is certainly non-representative of the total population.

A major problem for studies of this kind is the endogeneity of many variables, with Hotz, Klerman, and Willis (1997) concluding that the crucial challenge is "to find plausibly exogenous variation in proxies for the price and income concepts appearing in the theories." A time series analysis is vulnerable to trends in unobserved variables

(Besley and Case 2000). The data on communist demographic transitions have probably been affected by significant shifts in family structure, women's education, and many other factors that may have overcome the effects, if any, of pronatalist policy. In particular, with the rather detailed studies of the Uzbek demographic transition; pro-natalist policies were introduced in a climate of sharply declining birthrates, yet the study relied on time-series data. Such endogeneity can be plausibly avoided by utilizing an appropriate natural experiment that allows isolation of a particular pronatalist policy.

Milligan (2005) does precisely this by exploiting a natural experiment when the Canadian province of Quebec instituted the Allowance for Newborn Children (ANC) in 1988 that made direct cash payments up to $8000 to families following the birth of a child. Initially, the birth of a first or second child entitled the family to an immediate $500 dollar payment while third or higher children entitled the family to a series of payments totaling $3000. The amounts were steadily increased over time. The program was cancelled in 1997. This is an ideal test of the birth subsidy family of pro-natalist policies, as it is not disguised in any way and affects all people equally, including those of higher socio-economic strata. Milligan showed that there were no other government policies during this period that affected fertility, and attempted to avoid the endogeneity problem of the policy being instituted due to perceived declining fertility by using a triple-difference comparison of first and higher order births. Using a difference-in-differences study comparing overall Canadian fertility to that of Quebec following the introduction of the policy, Milligan found a large responsiveness of fertility to the birth subsidy. A $1000 dollar increase in benefits is estimated to increase the probability of having a child by 19.7%.

Milligan reconciles his strong results with the much weaker ones from the AFDC literature by noting the rather restricted sample those studies looked at. By constructing a subset of his data using women of those characteristics, Milligan showed results similar to those studying welfare effects on fertility. Another problem involves the possibility that the difference-in-differences approach is flawed as trends are different for Quebec and the rest of Canada. In particular, Quebec fertility had fallen below the Canadian baseline, and may very well be the impetus behind the introduction of the ANC. However, Milligan argues that there is little basis for these objections, and demonstrates that Canadian fertility and Quebec fertility generally trend together.

A much more problematic issue is the question of whether the fertility changes were transitory. It is possible that families in response to the ANC merely changed the timing of births without changing total fertility. Parent and Wang (2007) conducted a similar study using jurisdictional differences in the Canadian Family Planning Program in the 1970s, finding a strong increase in fertility in response to benefits, but also that the same cohort subsequently showed a decrease in fertility, possibly leaving ultimate fertility unchanged. Milligan does attempt to cover for this possibility by looking at available data on the cohorts in question, finding no evidence of a transitory response. However, this is relatively weak as the cohorts in question have not yet left reproductive age, meaning that a conclusive answer to the problem would have to wait a number of years until the data becomes available.

The ANC was canceled in 1997 due to a perceived lack of effect. In particular critics note that Quebec fertility had not appreciably increased while the program was in effect. Of course, Milligan contends that while true, this was in the backdrop of steadily

declining birthrates across Canada. The program was replaced by a system of subsidized child-care, switching from birth subsidy to government provided or subsidized services. Under the new program individual families were able to purchase daycare for $5 a day, later increased to $7. The policy is generally similar to European style subsidized child-care, which is available in many EU member states, including the policies in Norway and the rest of Scandinavia, albeit more generous. Like its European counterparts, the new system of subsidized daycare ran into serious problems of demand for daycare slots exceeding supply, which renders a study of the fertility effects difficult.

However, a some studies take advantage of this very effect to look at the fertility effects of state services, as the extent of over demand and under supply differs across regions. In Italy for example, while childcare is heavily subsidized by the state, the system is widely regarded as inefficient, with heavily varying actual access to publicly sponsored childcare depending on region and municipality. Chiuri (2000) studied the effects childcare rationing has on women's labor force participation and childcare decisions. She found, among other things, that access to childcare is much more important than the actual price in judgments of the value of a child-care subsidy. She also found that the availability of childcare options other than subsidized daycare is also a strong influence on decision making.

Finally, in addition to the various subsidies mentioned, many pro-natalist policies come packaged with relatively long periods of mandatory maternity leave. The theoretical fertility effects of maternity leave are uncertain, due to the various effects it is predicted to have on women's labor force participation, or gender equality in payment, as well as financially offsetting some of the costs of childbearing. Zhang et al (1994)

studied the effects of availability of Canadian maternity leave on fertility, finding non-significant results. However, Buttner and Lutz, looking at the expansion of maternity leave in Germany following 1976, and found a significant increase in fertility, with second or higher order births becoming much more likely, although first order births remained much the same. Winegarden and Bracy (1995) found substantially similar results with data from across the OECD, as does Gauthier and Hatzius (1997). The general consensus on maternity leave is that increasing it increases fertility, at least somewhat, but the effect may not be significant. As it is unlikely for maternity leave to have a negative effect on fertility, it being packaged with other clearly pro natalist programs should not pose a problem with measuring the extent to which such programs actually increase fertility.

The overall literature on the efficacy of government pronatalist policies is mixed. However, much of the weak or nonexistent relationships of AFDC and other welfare based studies can be reconciled by pointing to the fact that they cover a specific subset of women that do not accurately reflect overall responsiveness to pronatalist policy. The data from communist countries and the general set of time series studies might be better understood when compared with the Quebec case. The ANC was canceled in 1997 due to a perceived failure to improve birthrates, though Milligan shows that it was other factors that he controlled for that led to the perceived inefficacy.

Studies of the effects of services and subsidies on fertility generally conclude that both types of programs, when affecting representative populations, have pro-natalist effects. However as Park (2005) notes, with the elasticity's that he calculated, returning Singapore's fertility rates to replacement level would require a quadrupling of the value

of the already generous Singaporean pro-natalist package. Few studies have found

effects as large as the Milligan study, which renders it somewhat suspect, though that

such direct birth subsidies do increase fertility is essentially incontestable.

Section III: Previous Work on the Norway Case

Norway has a very large and comprehensive system of pro-natalist policies,

though few are billed as pro-natalist. In particular, the state subsidized system of

childcare for all children under preschool age where the Norwegian State pays for

roughly 50% of the cost of childcare, is specifically billed as intended for reducing

gender inequality in employment. The goal is to make male and female labor force

participation rates equal. This eliminates a persistent worry with studies of pronatalist

policies, as it is always possible that it is a particular trend in fertility that prompts the

institution of policies meant to reverse it, making it nearly impossible to separate the

effects of the policy and the existing trend. The worry is assuaged if none of the

pronatalist policies were actually enacted as a means to increasing fertility. Further,

Norway's comparatively high fertility rates for a Western European nation and especially

strong feminist movement makes it unlikely that the CFC reform or any other potentially

pronatalist policy is actually meant to increase fertility.

Of particular interest to this paper are the fertility effects of the pre-existing

system of policies before the CFC reform. Rindfuss et al (2007) looked at the effects of

the childcare subsidy. As already mentioned, the Norwegian system of public childcare

has mostly uniform quality across the country, but greatly differing degrees of

availability. The various programs are operated at the municipality level, and access to

quality childcare for an individual family differs from municipality to municipality, with

some municipalities having spots for all applicants with reasonable wait periods while

others have massive over-enrollment with extremely long wait periods for availability.

Rindfuss (2007) takes advantage of this difference to study the overall program's fertility

effects, in particular its effects on the timing of first births. Actual data on completed

fertility rates are not available at this time, but the timing of first birth, as reflecting the

transition into motherhood, is a good indicator of end fertility. They found a strong

positive effect of access of childcare on the transition to motherhood, though there remain

some questions as to the quality of their instrument, which measures access to childcare

through degree of over enrollment.

Figure 3.1: Usage of the CFC subsidy

Children with CFC-subsidy. % of all eligible children					
Year	% of all eligible children			% that receives full benefit, as a percentage of children that receives benefit		
	All	1 year	2 years	All	1 year	2 years
1999	78.5	85.7	71.7	89.8	94.8	84.0
2000	79.7	84.9	74.4	87.9	93.4	81.6
2001	79.1	84.5	73.5	88.1	93.5	81.7

Source. The National Insurance Administration.

The CFC reform was hugely popular after introduction, and had an extremely

high uptake rate. The majority of children eligible for the subsidy applied for and

received it, and further most of the recipients received the full amount of the subsidy.

The CFC reform has itself been subject to a great deal of study both prior and after its

implementation. For the most part, they have to do with possible effects on gender

equality. The Norwegian government is invested in achieving absolute gender equality,

with equal employment between men and women. (Statistics Norway 2001) The

generous subsidized childcare, the 50+ months of paid maternity and paternity leave, as

well as substantial child allowances were all aimed at and justified to Parliament through

reference to the expected improvements in gender equality. In particular, it was believed

that achieving near 100% usage of public pre-school childcare would encourage women

to enter the workforce. By and large, this had been successful, with the labor force

participation rate of married and cohabiting mothers of children under age 3 at 75% in

1998 immediately prior to the reform. (Ronsen 2001)

The primary opposition to the CFC reform was led by feminist groups who

believed that the reform would encourage women to stay at home to care for their

children instead of working and thus lose valuable work experience and seniority. This

question is of interest in studies of the fertility effects of CFC reform as it is possible that

the hypothetical lifestyle changes encouraged by the reform may affect the number of

children women choose to have.

Hellevik (2000) concluded that the proportion of mothers who worked before and

after the reform was unchanged, but there was a shift from full time employment to part-

time. Ronsen (2001) did a further study of this possibility using a multivariate analysis of

cross-sectional data from surveys carried out before and after the reform. The study

concluded that there was a decline in women's labor force participation rates from the

CFC reform, particularly among university educated women.

Figure 3.2: Comparison of Women's labor force participation

| Countries	Percentage in the labor force
Belgium	56.6
Denamrk	75.9
Finland	61.7
France	65.7
Netherlands	65.7
Norway	76.5
Sweden	76.4
United Kingdom	68.9
United States	70.8

Source: OECD Employment outlook.

However, the effect is small and nearly nonexistent among the lower educational groups. Further, the main effects of the reform have been delaying or preventing the shift from part-time work to fulltime, and reducing the number of people using subsidized childcare as opposed to other forms, including home care and private child-minders. Shone (2003), and Naz (2003) for the most part confirmed these results with difference in differences studies. Finally Hardroy and Shone (2005) found that despite the decline in female labor force participation, there is no evidence of a negative effect on women's wages.

The importance of these finding to a fertility study is unclear as it is uncertain how a reduction in women's labor force participation rate would affect the number of children women would choose to have. There is a possibility that extending the period outside of the workforce after birth could reduce fertility by increasing the time lags between first and higher parity children, thus pushing second and later children later in life when women face reduced natural fertility. However, the effect may well be the opposite, as the already long period of paid maternity leave coupled with the benefits

may encourage women to cluster their children closer together at a younger age, leading to higher overall fertility. (Naz 2003)

Figure 3.3: CFC reform and Women's work hours
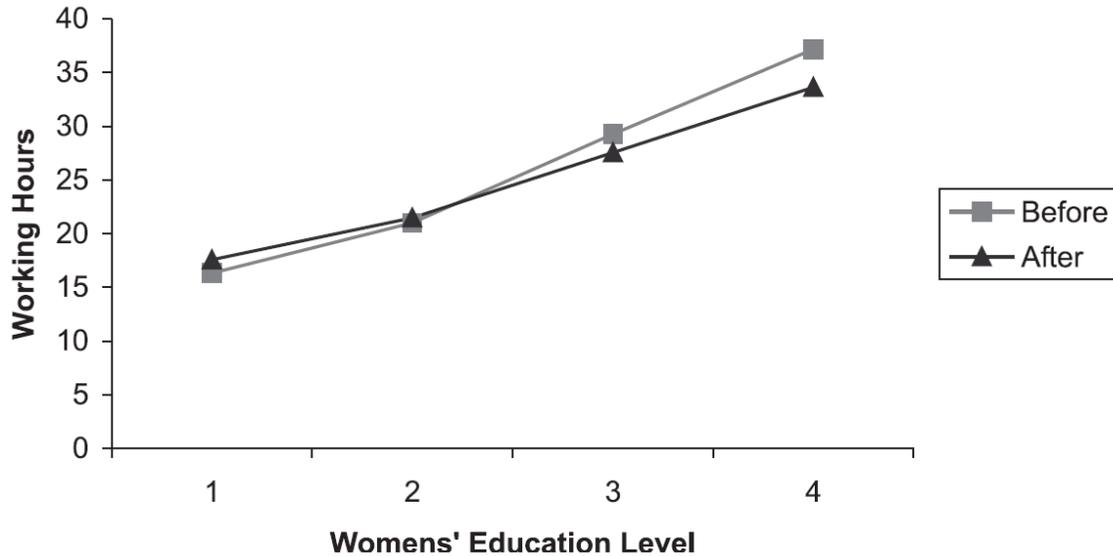
Whatever the direction of the effect on fertility, the magnitude is likely to be small due to the small size of the labor force participation shifts, so the problem can be safely ignored. Research into the CFC reform essentially confirms that the CFC reform and the subsidy system that it created were large enough to affect behavior. Further, that almost all research into the CFC reform were aimed at potential changes to gender equality supports the belief that the reform was not intended as pro-natalist, and thus is unlikely to be prompted by fertility changes.

Section IV: Theory

This paper assumes, as does most research in the field, the model of fertility proposed by Barro and Becker (1989). Parents are assumed to optimize a utility function

of the form $U(c, n) = \frac{c^{1-\sigma}}{1 - \sigma} + \beta n^{\epsilon} V$ where parents value own consumption c, number

of children n, and the utility of the children V. All constants are in (0, 1), and V>0. This

is subject to a budget constraint of $c + pb + qn \leq w$, where b is the number of births,

p is the price of childbirth, and q is the total ongoing cost of childrearing, and w is the

total income of the parents. Assuming zero infant mortality, b=n, and so the budget

constraint simplifies to $c + (p + q)b \leq w$. (p+q) in this case simply refers to the overall

cost of having and raising a child. All the major programs discussed, including the ANC,

subsidized childcare, paid maternity leave, and the CFC reform itself affect fertility

through reducing the (p+q) term. It does not require great work to understand that

reducing (p+q) shifts outwards the budget constraint. The existing research indicates that

for reasonable values of $\sigma, \beta, \epsilon \in (0, 1)$, this shift increases n. The difference between the

various programs is in how (p+q) is reduced. Maternity leave only affects working

women, and the value of subsidized daycare is reduced the more parents prefer alternate

forms of childcare, and is also dependent on location. Outright subsidies like the ANC

and the CFC reform introduced subsidy are the simplest, affecting all women who meet

certain minimal standards.

In theory, the standard set of pro-natalist policies, including publicly subsidized

childcare, as well as maternity and paternity leave should be less effective than a cash

subsidy of equal value. Some families may prefer childcare options that are not provided

for by public childcare programs, and would choose such if they were state subsidized to

the same extent as public daycare. Providing the same face value of subsidy in the

preferred form of childcare would reduce (p+q) by a greater amount than the same

subsidy in only public daycare. As such, switching a natalist program from services to cash subsidy should provide a greater incentive for at least some families without increasing program expenditures. With this intuition, given a goal of increasing fertility, Quebec switching from cash subsidy to subsidized childcare should have reduced the fertility increase for any given level of public expenditure. Milligan's study did not look at the changeover effects, and as the ANC and its successor program were not of equal face value, it would have been difficult to do a comparison in any case, particularly with the massive shortages that almost all systems of subsidized childcare face early after implementation.

In addition to those families who prior to the reform would use subsidized daycare but would prefer other childcare options, there are those who prefer public daycare to other childcare possibilities regardless of subsidy, and those who would choose other possibilities even if only public daycare were subsidized. To the first group, the CFC reform has a number of possible effects. If they had easy access to public daycare, then the reform would have the limited effect of increasing their options in the case they should change their mind. If they did not have easy access however, whether due to over-enrollment or location difficulties, then the reform serves as the new introduction of a childbirth subsidy. To the second group, those who never would have chosen public daycare, the CFC reform also serves as the introduction of a new subsidy for childcare. In these cases, the CFC reform should either have no effect, or is not expenditure neutral. Any fertility effects would come from extending the childcare subsidy to a larger segment of the population, and would correspondingly increase the amount the state would have to pay.

The CFC reform could affect the fertility of all three groups of parents, though it is only expenditure neutral for those who would switch from public daycare to alternate childcare after the reform. Overall, the prediction theory would make is that the reform should increase fertility, and some of this effect should be expenditure neutral.

Section V: Description of Data and Methodology

I try to estimate the fertility effects of the CFC reform with the difference in differences method. In particular, I am estimating

$$(\text{Fertility}_{\text{treatment,after}} - \text{Fertility}_{\text{treatment,before}}) + (\text{Fertility}_{\text{control,after}} - \text{Fertility}_{\text{control,before}})$$

Before and After refer to whether or not the CFC reform was in place. The treatment group is affected by the CFC reform once it is implemented, while the control group is completely unaffected by the reform.

For separation into (reform in place) and (reform not in place), I use 2 time brackets, one time bracket after the reform was implemented and one before. I follow precedent by testing the changes between 1995 and 1999. While the subsidy was increased from 2250 Kroner to 3000 Kroner per month in 2000, this increase was announced in late 1998, with the delayed implementation due to budgetary issues. As such, it is reasonable for parents to have anticipated the full amount of the subsidy when making the childbirth decision in 1998. Given the inherent lags of childbirth, births in 1999 reflect the first births made under the influence of the subsidy. However, while the choice of 1995 as the pre-reform group appears ubiquitous, I see no particular reason for it, and the longer the time period involved, the more likely that there would be

uncontrolled factors affecting fertility. As the reform was hard fought in Parliament

(Oslostudenten 1998), I argue that it would be unreasonable for parents who gave birth in

1998 to have anticipated the reform, as that would require them to have been confident of

its passing 9 months prior. Therefore, I repeat the tests using the years 1998 and 1999,

with births in 1998 not influenced by the CFC-reform, but births in 1999 under the effect

of the reform.

Figure 5.1: Fertility Rates, Norway and Denmark
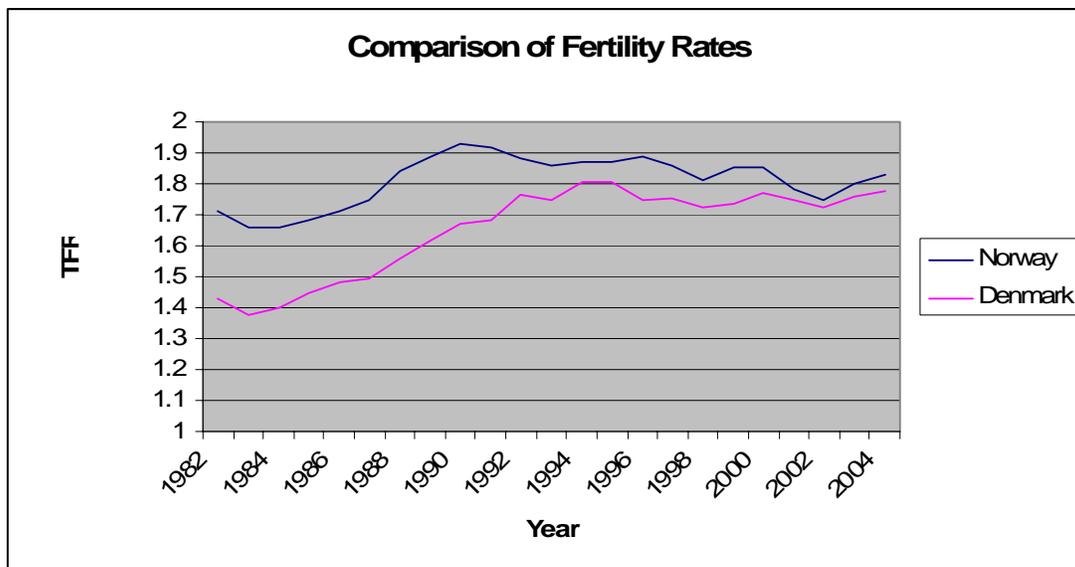
Source: Statbank Norway, Denmark 2007

For determining the control group and the test group, I follow 2 different paths. I

note that Norway's neighbor Denmark had a similar system of policies that could be

labeled pro-natalist, and also that it experienced no reforms of its system in the time

period 1995-2000.

Figure 5.1 plots total fertility rates between 1982 and 2004 for Norway and

Denmark. As Scandinavian countries with tightly linked economies and similar cultures

as well as similar systems of social policies, their fertility rates also closely mirror each

other in general movement after 1992. It is therefore appropriate to estimate the effects

of the CFC reform by using Denmark as the control group. A look at the fertility

movements in the latter half of the 90s indicates this choice may be appropriate. The

table below shows the existence of a positive difference in the fertility changes from a

time before the CFC reform to after for Norway and Denmark.

Table 5.2: Total Fertility Rates, Norway and Denmark

Total Fertility	Denmark	Norway	Difference
1995	1.81	1.87	0.06
1998	1.72	1.81	0.09
1999	1.73	1.85	0.12
D95-99	-0.08	-0.02	0.06
D98-99	0.01	0.04	0.03

Source: Statbank Norway, Denmark 2007

Testing for the magnitude and significance of this difference provides an

estimation of the fertility effects of switching between publicly subsidized childcare and a

birth subsidy. In both Norway and Denmark prior to the reform, there existed publicly

subsidized childcare, but after the CFC reform, Norwegian parents gain the subsidy for

their children whether or not said children are enrolled in daycare. This is fundamentally

the same as a birth subsidy of the same sort as the ANC in Quebec.

For my second approach, I follow the work of Rindfuss et al (2007) who noted the

fertility differences between Norwegian municipalities with easy access to subsidized

childcare and those without. Prior to the CFC reform, while the state subsidy for

childcare is uniform nationwide in Norway, actually gaining the subsidy requires

acquiring a spot in a state approved daycare center. These include centers operated by

the central government, municipalities, counties, parents' associations, and both for and

nonprofit private companies. However, while some municipalities have enough daycare

centers to provide for all or nearly all demand, others have a handful of centers that are

significantly overenrolled, and yet others have no easy access to daycare centers at all.

Parents in municipalities with no or poor daycare coverage, while eligible for the subsidy,

would not be able to actually collect it without gaining a difficult to acquire spot in a

daycare center. The implementation of the CFC reform would even this out, as even

parents without easy access to public childcare would be able to collect the state subsidy.

Figure 5.3: Usage of the CFC subsidy by Region (2002)

Region	% of families receiving CFC subsidy
Akershus and Oslo	54
Hedmark and Oppland	81
Rest of Østlandet	79
Agder and Rogaland	84
Western Norway	75
Trøndelag	79
Northern Norway	67

Source: Social Office, Norway

As the figure above shows, the percent of families receiving some form of the CFC

subsidy is lowest in the Oslo region, which also has the easiest access to public childcare

thanks to relatively dense population and intense investment by the central government.

The regions with the highest % of recipients are those with the worst access to public

childcare.

I calculate the extent of childcare coverage through dividing the number of slots actually available for each municipality in Norway by the number of daycare slots demanded by parents. This value does not precisely reflect the actual degree of over-enrollment as many parents demand spots in publicly subsidized daycare centers simply as a means of gaining a spot in line without necessarily yet having children to put in daycare. As such, it is to be expected that this phenomenon would be the strongest for those municipalities with the highest degree of over enrollment since those parents would have an exceptionally strong incentive to hold a spot in line. Therefore, this measure of childcare availability will tend to overestimate over-enrollment, and this overestimation would be greater the greater the degree of over-enrollment.

Table 5.4: Childcare Coverage for Norwegian Municipalities

	Obs	Mean	Std. Dev.	Min	Max
availability	433	.457816	.3087935	0	2

However, this problem does not affect my particular study as I am merely using the measure to separate municipalities into those with generally adequate public childcare coverage, and those without.

Those without adequate public childcare coverage are the test group, while those with adequate coverage are the control group. In this case, the estimation would not be of the fertility effects of the CFC reform, as the reform also affects those municipalities with adequate coverage. However, because of this, it can act as a lower bound for the fertility effects of implementing a new birth subsidy. Generally speaking, the CFC reform would be the new implementation of a birth subsidy for those without access to the previous childcare subsidy, while acting as a switch between public daycare subsidy and birth

subsidy for those with access to the childcare subsidy. The estimation would provide a gauge for how the reform affected different parts of Norway.

For data, I use municipal birth registers from Statistics Norway and Statistics Denmark. I calculate the probability of a woman in a given municipality giving birth in a given year with the number of births divided by the number of women of childbearing age, with childbearing age defined as 15-49.

Table 5.5: Muncipal Childbirth Probabilities, Norway and Denmark

Probability of Birth, Denmark vs. Norway	Denmark	Norway	Difference
1995	.0542291	.0556671	.001438
1998	.0518368	.0527348	.000898
1999	.052394	.0547057	.0023117
D95-99	-.0018351	-.0009614	.0008738
D98-99	.0005572	.0019709	.0014137

Table 5.6: Municipal Childbirth Probabilities, High and Low Coverage

Probability of Birth, Norway: High vs. Low coverage	High	Low	Difference
1995	.0576153	.0538325	-.0037828
1998	.0548811	.0545405	-.0003406
1999	.0528582	.0557854	.0029272
D95-99	-.0047571	.0019529	.00671
D98-99	-.0020229	.0012449	.003267

For this study, I run 4 tests using the difference in differences method. Had I been using individual data rather than municipal aggregates, a probit or logit model would be more appropriate. However, in this case, I use OLS regression of the form:

$$Y_i = \beta 0 + \beta_1 X_i + \beta_2 C_i + \beta_3 t_i + \beta_4 (C_i \cdot t_i) + \varepsilon_i.$$

For the tests using Denmark as the control group, Y represents the probability of childbirth, X represents a set of controls, C is a dummy variable that takes on the value of 1 if Norway, 0 if Denmark, and t is a dummy variable taking on the value of 0 in the period before the CFC reform and 1 after. The estimator β_4 estimates

(Norway, 1999 – Norway, 1995) – (Denmark, 1999 – Denmark, 1995) and

(Norway, 1999 – Norway, 1998) – (Denmark, 1999 – Denmark, 1998)

for the two tests I run.

For the tests using high childcare coverage Norwegian municipalities as the control, Y is probability of childbirth, X are controls, C is a dummy taking on the value of 0 for high coverage municipalities and 1 for low coverage, and t is a dummy variable taking on the value of 0 before the reform and 1 after. β_4 in this case estimates

(Low Coverage, 1999 – Low Coverage, 1995) – (High Coverage, 1999 – High Coverage, 1995) and

(Low Coverage, 1999 – Low Coverage, 1998) – (High Coverage, 1999 – High Coverage, 1998)

for the two tests.

In all cases, I control for economic factors, the ethnic makeup of the women of childbearing age, and education levels. The data is drawn from various datasets from Statbank Denmark and Norway. Economy is reflected by the robustness of the job market, specifically for men. Ethnic makeup is defined by proportion of women of childbearing age that are first or second generation Eastern European or non-European in

origin, and education level is defined by the proportion of women of childbearing age

with post-secondary education

Table 5.7: Description of Control Variables, Norway and Denmark

Summary Statistics for controls	Economy	Immigrant	Education
Denmark			
1995	.2128164	.056354	.0060427
1998	.1430634	.0751267	.0079669
1999	.1294252	.0565258	.0084817
Norway			
1995	.0940169	.050251	.017746
1998	.0534762	.0577202	.022644
1999	.0576597	.050251	.0246002

Table 5.8: Description of Control Variables, High and Low Coverage

Summary Statistics for controls	Economy	Immigrant	Education
High Coverage			
1995	.0999541	.0574431	.061225
1998	.0604937	.0667977	.069662
1999	.0638811	.0574431	.085838
Low Coverage			
1995	.0884258	.0434781	.007746
1998	.0468678	.0491718	.021334
1999	.0518009	.0434781	.024501

Table 6.1: Difference in Differences, Denmark/Norway, 1995/1999

Independent Variable*	Coefficient	Standard Error	t	P>|t|
Norway dummy	-0.00067	0.001046	-0.64	0.524
1999 dummy	-0.00327	0.000978	-3.34	0.001
1999 dummy*Norway	0.001681	0.001107	1.52	0.129
Implied % Increase in Probability of Childbirth	3.21%			
R-squared	0.02			

* Control variables are omitted from this table

The results from this test are inconclusive. The regression implies a .001681 increase in the probability of childbirth from the implementation of the CFC reform. As the 1995 probability was .0556671, and the time trend was -.00327, the implied percentage increase in the probability of childbirth is 3.21%. However, the p-value is above 5%, so the result cannot be considered statistically significant. The results do provide evidence against the possibility that the CFC reform actually reduces fertility, which while an unlikely result, could have been possible under some certain assumptions for the childbearing decision.

Table 6.2: Difference in Differences, Denmark/Norway, 1998/1999

Independent Variable*	Coefficient	Standard Error	t	P>|t|
Norway dummy	-.0027663	.0009865	-2.80	0.005
1999 dummy	-.0001188	.0008464	-0.14	0.888
1999 dummy*Norway	.0021995	.0010707	2.05	0.040
Implied % Increase in Probability of Childbirth	4.18%			
R-squared	0.0351			

* Control variables are omitted from this table

The test using 1998 as the pre treatment year is much more promising. The regression estimates the increase in the probability of having a child from the implementation of the CFC reform at .0021995 with a p-value of 0.04, indicating statistical significance. As the probability in 1998 was .0527348, and the time trend was -.0001188, the implied percentage increase in the probability of childbirth is 4.18%.

The estimates of the coefficients of the control variables yield no surprises. A stronger job market is correlated positively and strongly with the probability of childbirth. The proportion of the childbearing female population that is a first or second generation East European or non-European immigrant is also positively correlated with fertility. The effect of education is unclear, as the effect was not statistically significant in either test, and was positive for the first and negative for the second.

Why the test using 1995 as the base year yielded inconclusive results is unclear. However, the answer may be due to underlying trends in Danish Fertility. As can be seen in Figure 5.1, Danish fertility was converging on the Scandinavian norm prior to the period in question. It may be that Danish fertility was reverting to mean in the period

1995-1999, and thus the time trend in fertility was different in Denmark than in Norway despite the similarities in culture and economy. In this case, the problem did not arise between 1998 and 1999 due to the underlying trends evening out between Norway and Denmark between 1995 and 1998.

Assuming that the 1995 result can be discounted due to the problem of underlying trends, the result from the 1998 test would be the true estimate of the fertility increase from implementation of the CFC subsidy. So a woman of childbearing age under subsidized daycare *and* the CFC subsidy should she choose not to use public daycare fulltime would have 4.18% higher fertility than a woman under the subsidized daycare alone. This result can be interpreted as the fertility benefits of switching from subsidized daycare to a birth subsidy for children aged 1 and 2, as under the reform, one can receive the cash subsidy or the daycare subsidy but not both to the full amount. However, this interpretation is limited by the fact that the implementation of the reform involved increases in state expenditures, so the switchover is not expenditure neutral. For some women, it is not replacing the subsidized daycare with a birth subsidy, but rather the new introduction of a birth subsidy.

For the study of differences in fertility effects from the CFC reform between municipalities with high and low public childcare coverage, the results are much clearer.

Table 6.3: Difference in Differences, High/Low Childcare Coverage, 1995/1999

Independent Variable*	Coefficient	Standard Error	t	P>|t|
Low coverage dummy	-.0037459	.0011177	-3.35	0.001
1999 dummy	-.0025782	.0011874	-2.17	0.030
1999 dummy*Low coverage	.0034446	.0015429	2.23	0.026
Implied % Increase in Probability of Childbirth	6.72%			
R-squared	0.0158			

* Control variables are omitted from this table

The municipal childbirth probability for low coverage municipalities in 1995 is

.0538325, and the time trend is -.0025782, so the regression estimate of .003446 implies

a 6.72% greater increase in fertility in municipalities with poor public daycare coverage

than municipalities with adequate coverage.

Table 6.4: Difference in Differences, High/Low Childcare Coverage, 1998/1999

Independent Variable*	Coefficient	Standard Error	t	P>|t|
Low coverage dummy	.0030456	.0011422	2.67	0.008
1999 dummy	-.0021861	.0011253	-1.94	0.052
1999 dummy*Low coverage	.0033045	.0015594	2.12	0.034
Implied % Increase in Probability of Childbirth	6.31%			
R-squared	0.0105			

* Control variables are omitted from this table

The second regression estimates the effect of the reform as .0033045, which

combined with the 1998 childbirth probability for low coverage municipalities of

.0545405 and the time trend of -.0021861, yields an implied estimate of 6.31% greater fertility increase in low coverage municipalities compared with high coverage municipalities.

Unlike the tests using Denmark as the control group, the tests using high public childcare coverage municipalities as the control yielded no ambiguous results. As expected, municipalities with poor access to public daycare were more affected by the CFC reform than those municipalities with good access to public daycare. The estimates from the 1995 test and the 1998 test are very close to each other, strengthening the point. It is likely that there is no difference between the estimates resulting from the two tests unlike the case of Denmark as the control, since with both control and test groups being made up of Norwegian municipalities, there is no difference in underlying trend throughout the entire period in question.

The results can be interpreted as the CFC reform increasing the fertility of women in municipalities with poor public daycare coverage 6.3% more than the increase in fertility, if any, of women in municipalities with good public daycare coverage. One needs to be careful in making this interpretation however. The availability of public daycare across the municipalities is not binary, either excellent or non-existent. Further, even in municipalities with excellent daycare coverage, even in Norway where women generally prefer public daycare to home care for extremely young children, some women would still not use public daycare for children aged 1 and 2. Thus, it is entirely possible that the difference in the effect of the CFC subsidy is due to the proportion of women who previously were unsubsidized due to lack of access, gaining what is to them an entirely new birth subsidy, being different between the different municipalities.

One can make no conclusions as to the fertility effects of an expenditure neutral switch between subsidized daycare and a birth subsidy, though it is clear that a simple switch between subsidized daycare and birth subsidy increases fertility. It is unlikely that a natural experiment would occur that allows an expenditure neutral switch to be rigorously studied. However, one can make some general observations from the results here. The estimated difference in the fertility effects of the CFC reform on municipalities with and without easy access to public daycare is greater than the estimated fertility effect of the reform itself on Norway. While the confidence intervals of the estimates do overlap, this suggests that any fertility effects of an expenditure neutral switch between subsidized daycare and a birth subsidy are likely to be very small.

Finally, one must reconcile the results with other estimates of the effect of pro-natalist policies. Milligan in his study of the ANC birth subsidy in Quebec estimated a 19.7% increase in fertility from a birth subsidy of C$1000. The CFC subsidy, being a monthly payment of 3000 kroner: beginning when a child is 13 months and ending at 36 months, totals over 8000 Euro. This is a vastly greater sum than the ANC subsidy, but I find fertility effects much smaller than Milligan's 19.7%. Partly, this would be due to the fact that while the ANC truly affected everyone in Quebec, the CFC subsidy only fully affected those people who could not use or preferred not to use Norway's previously existing subsidized daycare. Those people who prefer other forms of childcare, but used subsidized daycare because it was subsidized would only be partly affected, and those that prefer public daycare regardless would barely be affected at all. However, considering close to half of Norway's families receive at least some amount of the CFC subsidy, this does not entirely explain the disparity.

I have no solid explanation of the disparity, but I hold that Milligan's estimate was too high.

Figure 6.5: Quebec vs. Canadian Fertility
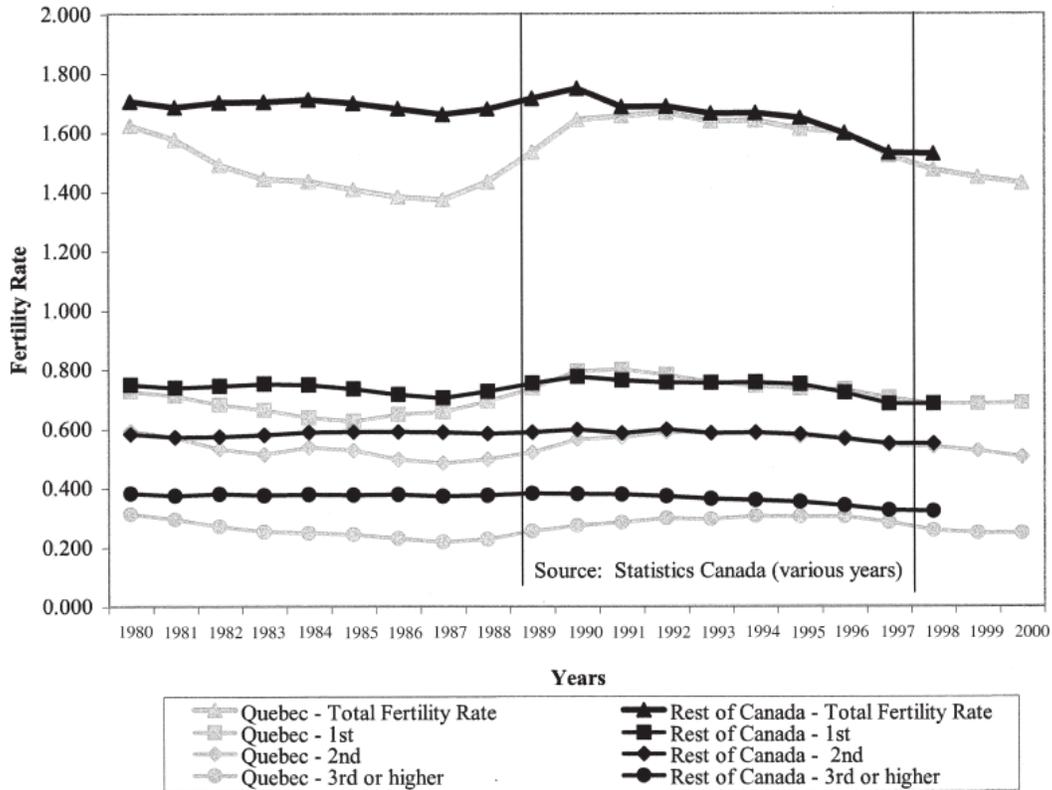
From: Milligan (2007)

Figure 6.5 shows that Quebec fertility was on an upswing, seeming to be converging with the rest of Canada even before the ANC subsidy was introduced in 1988. Thus Milligan's difference in differences estimator may have picked up part of this underlying trend, and thus be an overestimate of the true effect of the subsidy. In addition, Milligan's numbers are high in comparison to other studies of the fertility effects of pro-natalist policies. Finally, Singaporean studies finding even lower effects than I found for subsidies of roughly equivalent value suggest that there may be

diminishing returns at work, or perhaps even that different peoples have differing

elasticities in response to pro-natalist policies.

Section VII: Issues

This thesis, although providing some interesting results, has a number of key

flaws that may undermine its conclusions.

First, it was not done using the optimal data sets. Both Norway and Denmark

maintain highly accurate population registers; that among other things, tracks each and

every person, including family conditions, childbirth, economic conditions, and many

other variables. A probit model regression using the individual data to estimate the

changes in the probability of childbirth would be greatly preferable to the municipal

aggregates that I used. Most importantly, using the municipal aggregates requires an

assumption that people moving from municipality to municipality do not skew the

results. This assumption seems reasonable as the CFC implementation should reduce any

incentive for people to move in order to gain access to quality childcare, but such an

assumption would not be necessary with individual data. Further, individual data would

allow for better controls, as the economic performance of a particular location is only a

somewhat effective proxy for the economic condition of particular families or people,

and the same holds for education, and any number of other factors that may affect

fertility.

Unfortunately, such individual data is open to abuse, and thus is generally not

made available to Norwegian students without good reason, and is not made available to

non-Norwegians without either government sponsorship or a Norwegian co-author. The individual data that I was able to acquire had been so de-individualized that I could not control for location or any other relevant factors. However, it would be interesting to see this thesis repeated with individual data, and may provide more accurate and valid results.

Second, like the Milligan ANC study, study of the fertility effects of the CFC reform is limited by the fact that the women affected by it have not yet left childbearing age. There is the possibility stated by Parent and Wang (2007) that any fertility changes are only transitory. It could be that the CFC subsidy only allowed Norwegian parents to have children earlier or closer together than they otherwise could have, without changing end family size. This question can only be settled with the release of completed cohort fertility data in roughly 30 years. However, I note that neither Milligan nor Park (2005) found evidence of a transitory change when looking at fertility in the years following their studies.

Section VIII: Conclusion

This paper finds evidence that Norway's introduction of the Cash-for Care

Reform, though not meant for pro-natalist purposes had pro-natalist effects. In particular,

I find that the introduction of the CFC subsidy, with a value of 72000 kroner or

approximately 8000 Euro paid over two years, increased Norwegian fertility by over 4%

from the baseline of what fertility would have been had no CFC reform been enacted.

Further there is strong evidence that the fertility effect of the CFC reform was stronger

when there was poor access to public daycare. I find that municipalities with low public

daycare coverage had a fertility increase of 6% over those municipalities with high public

daycare coverage. These numbers suggest, but do not confirm as more work needs to be

done, that the fertility effects of an expenditure neutral switch between subsidized public

childcare and a birth subsidy are likely to be small.

The existing research on the effectiveness of pro-natalist policies have mixed

results. However, these results may be due to difficulty in separating out the effects of

underlying trends. My findings generally confirm the hypothesis that implementing the

CFC reform: by subsidizing childbirth, and thus reducing the opportunity costs of

childbirth/childrearing, had a positive effect on fertility rates. However, this conclusion

is somewhat weakened by the inconclusive results of the 95-99 test of the fertility effects

of CFC reform implementation. Finally, the suboptimal nature of the data sets used, and

the lack of completed cohort fertility data indicate that it may be worthwhile to redo the

analysis in this paper in the future with improved data to gain a more conclusive

understanding of the effects of the Norwegian CFC reform in particular and pro-natalist

subsidies in general.

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