Lifetime Impact of Cash Transfer on Fertility

Young-Il Albert Kim†

In most OECD countries, fertility level is below the natural generation replacement level. A number of undesirable social and economic effects stem from decreasing population and rising age composition of population. To counter decreasing fertility, many OECD countries implement pro-natal policies including direct cash transfer schemes. Impact of cash schemes are estimated in many countries including Germany, Sweden, France and Israel. However evaluations of long run impact of such policies are surprisingly rare. We investigate whether the cash transfer increases completed fertility, exploiting quasi-experiment arising from a pro-natal cash transfer called ANC (Allowance for Newborn Children). We first devise a measure of ANC impact for different birth cohorts using age-specific fertility rates because the policy lasted for a decade and it affected cohorts with different intensities at different ages. The results show that ANC impact on fertility has little permanent component.

Keywords: Fertility, Child Subsidies, Birth Subsidies
JEL Classification: D1, H31, I38, J13

† Department of Economics, Sogang University in Seoul, South Korea. We are deeply indebted to Gary Becker, Patrick Heuveline, and John List for their helpful comments and interest in this project. We thank Jungmin Lee, Sok Chul Hong, Sung Man Moon and participants at a number of seminars for their valuable inputs.

1. Introduction

Fertility levels of most OECD countries started to fall rapidly in 1970s and their fertility levels were below replacement level by 1983 (See Figure 1). By 2002, total fertility levels of all OECD countries except Mexico and Turkey were below replacement level (OECD 2005). Assuming no external migration, population level will decrease in those countries and their population structure would be adversely affected. Decreasing population lowers the growth of real GDP, per capita GDP and domestic savings and changing population structure creates pressure on government budget as smaller number of working population will have to support greater number of pensioners. All OECD countries have tried to instigate birth by policy instruments including family cash benefits, childcare support programs, increased duration of maternity and parental leave and general social protection system. Cash transfer is one of the most popular pro-natal policies. As of 1998, almost eighteen OECD countries were spending more than one percent of total GDP on family cash benefits to instigate birth including Australia, France and the United Kingdom (Sleebos 2003).

Buttner and Luz (1990) and Hoem (1990) find that a set of pro-natal policies mainly aimed to reduce child rearing cost to instigate births in East Germany and Sweden were effective in increasing fertility. Recent evidence from France and Israel indicates that such policies are also effective in increasing fertility (Salanie and Laroque 2005, Cohen et al. 2007). Zhang et al. (1994) show that all of the fiscal incentives for giving births such as personal tax exemption for children, child tax credit, family allowances, and maternity leave benefits in Canada all have statistically significant and positive effect on fertility, using vital statistics from 1921 to 1988.[1] In Canada, provincial government of Quebec implemented a universal cash transfer scheme called Allowance for Newborn Children (ANC) from May 1988 to September 1997 to all legal residents of Quebec.[2] Milligan (2005) use household level Census data and find that implied

[1] Personal tax exemption giving tax deduction to dependents was first introduced in 1918 in Canada. In 1945, the family allowance benefit to all families with dependent children was introduced and maternity leave benefits were available starting in 1971 as part of Unemployment Insurance Program. Later, child tax credit was introduced in 1977.

[2] Duclos, Lefebvre, and Merrigan (2001) found a positive effect of the ANC on fertility using data obtained only from vital statistics.

percentage increase in probability of having a child is approximately 12 percent as summarized in Table 1. [3] However the evaluation of long-run policy impact is surprisingly rare.

In this paper, we first devise a measure of policy impact on different birth cohorts, because ANC lasted for a decade and each birth year cohort of women were affected by the policy at different ages. Then we estimate effect of ANC on completed fertility level, the measure of lifetime fertility across time for each given cohort. We exploit quasi-experimental nature of the universal cash transfer program that lasted for a decade in only a part of the country to investigate if the policy has statistically significant impact on completed fertility. The results indicate that ANC had little impact on increasing completed fertility of Canada.

2 Empirical Strategy

Before we run our main analysis, we first replicate Milligan (2005) but we add age group dummy variable. The difference-in-differences method is used for the analysis of age-specific impact of the ANC to verify that the policy impact varies by age group. If different age groups are affected differently by ANC, some of the age-specific impact variation may be due to the shift in birth timing and long run ANC impact may only be estimated by using completed fertility level. The dependent variable is whether the household had at least one child during the five year census window. The linear probability method is used for the analysis. The equation to be estimated takes the following form:

$$\text{Had a Child}_{ijt} = \beta_0 + \beta_1 Quebec_{ij} + \beta_2 1996\ dummy_{it}$$

$$+ \sum_k \gamma_k Quebec_{ij} \times 1996\ dummy_{it} \times Age\ Group\ Dummy_{ik} + \sum_m \delta_m X_{ijtm} + e_{ijt} \quad (1)$$

where *i* indexes individuals, *j* indexes provinces, *t* indexes time *k* indexes age groups and *m* indexes individual traits. We used all the individual traits used in Milligan (2005). X variables include the number of children who were born before the census window in each household; the

[3] See Table 1 for summary of past studies. Buttner and Luz (1990) studies strong pro-natal policy implemented in East Germany in 1972. They show that age specific fertility levels increases in response to the policy. Hoem (1990) shows that increasing financial incentive to birth increased fertility rates in Sweden. Salanie and Laroque (2005) uses microsimulation model using individual level data to show that financial incentives have significant impact on increasing fertility in France. Cohen et al. uses child subsidy level variation in June 2003 in Israel, using household level data from 1999 to 2005 to show that reduction in child benefit has significant impact on fertility decision of Israeli household. Milligan uses Canadian Household Census data to show that ANC had significant impact on fertility.

ages of the female and male members of each household as they were reported as one of four age groups, 15-24, 25-34, 35-44, and 44+; immigrant status; mother tongue; and terminal level of schooling of the male and female spouse of each household; the marital status of the heads of each household; urban dummy variable that shows if the household was located in a census metropolitan area (CMA), which was formed by one or more adjacent municipalities centered on an urban area of at least one hundred thousand people; and household income before social transfers, a total of all household wages, household self-employed income, and household investment income. The coefficient γ_k represents ANC impact on probability of childbirth of age group *k,* hence γ_k would be greater than zero. If$\gamma_k > \gamma_{k'}$, it indicates that age group *k* is more sensitive to ANC than age group *k'*. Idiosyncratic sensitivity represented by different γ_k for each age group implies that impact of policy differs by age group and a measure of ANC impact should incorporate varying age at which each cohort is exposed to the policy.

We devise a measure of ANC on fertility for different cohort using age-specific fertility level called age-adjusted ANC exposure and first run linear regression analysis to estimate permanent impact of ANC on fertility:

$$Completed\ Fertility_t^{Quebec} = \beta_0 + \beta_1 Age\ Adjusted\ ANC\ Exposure_t$$

$$+\beta_2 Completed\ Fertility_t^{Rest\ of\ Canada} + \beta_3 Cohort\ Year_t + \beta_4 Cohort\ Year_t^2 + e_t, \qquad (2)$$

where t indexes birth cohort. We included age adjusted ANC exposure, completed fertility of rest of Canada and the cohort year as independent variables. Any time varying trend in completed fertility level common to all Canada would be captured by completed fertility of rest of Canada. Cohort year and its quadratic term would capture other time and provincial varying factors that affect completed fertility in this model. Our purpose was to identify the impact of age-adjusted exposure to ANC on completed fertility of Quebec and other time varying differences that are common across Canada or that are different between provinces would be controlled by other independent variables. The key coefficient isβ_1. The coefficient represents impact of ANC on completed fertility hence it would be greater than zero and significant if ANC has statistically significant impact on completed fertility level.

We test if results are robust to the use of alternative measure of ANC impact by replacing the measure of ANC impact from age adjusted ANC exposure to the number of child bearing years

that each cohort spent under ANC. Age 15-44 is considered childbearing, as the age group is typically used to estimate total fertility rate.

Then we use difference-in-differences method in equation (3) to estimate impact of ANC on completed fertility level, treating completed fertility level of both Quebec and the rest of Canada as dependent variable:

$$Completed\ Fertility_{jt} = \beta_0 + \beta_1 Age\ Adjusted\ ANC\ Exposure_{jt}$$

$$+\beta_2 Quebec_{\mathrm{j}} + \beta_3 Cohort\ Year_{\mathrm{t}} + \beta_4 Cohort\ Year_t^2$$

$$+\beta_5 Quebec_{\mathrm{j}} \times Cohort\ Year_{\mathrm{t}} + \beta_6 Quebec_{\mathrm{j}} \times Cohort\ Year_t^2 + e_{\mathrm{jt}}, \quad (3)$$

where *j* indexes provinces and *t* indexes time. In this model, we pile up data from Quebec and the rest of Canada, treating age adjusted ANC exposure of rest of Canada as zero to test if results are still robust. Quebec dummy variable coefficient controls any time invariant Quebec specific trend and time trend dummy variable coefficients of cohort year and its quadratic term controls any region invariant time trend. The interaction term coefficient β_4 captures Quebec specific time trend. The coefficient of interest is β_1, the measure of impact of ANC exposure on completed fertility. Again if there is statistically significant impact of ANC on completed fertility level the coefficient would be positive and significant.

3 Data

Before ANC, provincial government of Quebec and the federal government already had various policy measures related to child rearing before ANC.[4] In May 1988, provincial government of Quebec enacted a universal cash transfer system called ANC for all legal residence of the Province. A household with a newborn baby received C$500 for the first and the second child and C$8,000 for the third or higher parity child in cash. The amount gradually increased to C$500 for the first child, C$1,000 for the second child and C$8,000 for the third or higher parity child in cash by May 1992 (See Table 2). The subsidy amount rose over the years and observing this, the expectation of households may have been to shift births to later in their lives because

[4] To name a few, provincial government provided basic non-taxable family allowances, young children allowances and tax credit for children. Federal government of Canada provided taxable family allowances, refundable tax credit per child and supplement for children under 7 up to 1992 as well as child tax benefit program from 1993.

delaying the timing of the births could result in a higher amount of cash transfer, based on the trend. Unfortunately, it is impossible to test the impact of the year-to-year revelation of transfer amount increase on timing of fertility, because the census is not available year-to-year but is only available every five years (See Figure 2). The program lasted for a decade until May 1997 until it was replaced by other programs.[5]

For age-specific impact analysis in equation (1), we selected data from 1991 and 1996 Canadian Census Public Use Microdata Files on Families to control for the individual household level traits such as income, education level, language, immigration status, and age groups. 1986 and 2001 census files reported 345,351 families and 348,104 families, respectively.[6] We compared per female age group probability of fertility of Quebec households relative to rest of Canada for partially affected Census window (1991) versus completely affected Census window (1996) to test if subsidy amount was substantial enough to significantly affect fertilities of households likely to be facing terminal period in lifetime birth cycle. [7]

We used completed fertility level of Quebec and the rest of Canada for 1934 to 1962 cohorts to analyze the effect of ANC on completed fertility level, as in equation (2). However, measuring exposure to ANC per birth cohort is not straightforward. Fertility rate varies by age hence each cohort is affected differently by ANC. Age-specific fertility measures how many children are born per 1,000 women in the age group on average. We created a measure of ANC exposure called age-adjusted ANC exposure by incorporating age-specific fertility rate of Quebec. The measure uses the age of each cohort during the decade at which ANC was implemented and

---

[5] In May 1997, the ANC was replaced by the Quebec Family Allowance (QFA), which limited the baby bonus recipients to low income families; thus, it benefitted families with a family income of less than C$20,291. The QFA is non-taxable and is paid to low-income families each time they had a child; the stipend amount depends upon the family size and income. Low income households have gained from these reforms while the transfer was decreased for other sets of households (Baril, Lefebvre, and Merrigan, 2000). In addition, the Canada Child Tax Benefit (CCTB) and the National Child Benefit Supplement (NCBS) replaced the old Child Tax Benefit as part of the implementation of the National Child Benefit Program (NCB) at the federal level in 1998. The CCTB and NCBS subsidized births to low income families at a federal level.

[6] We excluded households that moved across provinces in the past 5 years to remove samples whose place of childbirth could not be allocated clearly. People who were not legal residents of Canada were not eligible for the ANC, so they were excluded. Households who could not account for the number of children were removed as well.

[7] Milligan (2005) also used 1991 Census as partially affected group and 1996 Census as completely affected group.

estimates how many children are born on average per 1,000 women per cohort when they were under the influence of ANC.

Age-adjusted exposure to ANC was estimated as it follows. First, for each cohort the age at which they were under the influence of ANC was calculated, that is, the age of each cohort between 1988 and 1997. Then, the age-specific fertility of Quebec was summed up by the age at which each cohort was under the influence of ANC. For example, for 1944 birth cohort, as they were under the influence of ANC between 44 and 53, we summed up age-specific fertility level from 44 to 53. ANC impact, weighted by age-specific fertility level, is only 5.22 average births per 1,000 women for 1944 cohort. [8] Figure 3 shows completed fertility levels of Quebec and the Rest of Canada along with age-adjusted exposure to ANC for birth cohorts 1934 to 1962. Between 1988 and 1997, the ANC policy window, 1944 birth cohort was aged between 44 and 53 (See Figure 3). Once weighted by the age-specific fertility level, 1944 cohort was the first cohort whose fertility level was significantly affected by ANC. Age-adjusted exposure to ANC gradually increases until 1962 cohort, who was aged between 24 and 33 when ANC was present, at 798 average births per 1,000 women. Between 1934 and 1963 cohort, the decade long ANC progressively affects age-adjusted exposure to ANC.

4 Results and Discussions

Birth subsidy may only cause a temporal shift in the timing of childbirths. Milligan (2005) argued that ANC impact was permanent rather than transitory because the difference in the average number of childbirth between Quebec and the rest of Canada rose between 1991 and 1996 (p.550). However, ANC was enacted in 1988 and it is not likely that the transitory impact would be completed in 8 years. Therefore we directly compare the completed fertility levels of Quebec and the rest of Canada from 1934 to 1962 birth cohorts.[9] We first test if ANC impact varies by age group using household level Census data (See Table 3). We find strong support for age-specific responses to ANC and the need to generate age-specific measure of ANC impact.

---

8 1944 birth cohort was under the influence of ANC while on average 5.22 children are born out of 1,000 women of the age group, the total average number of children born between the ages of 44 and 53 in Quebec. Likewise, 1963 birth cohort was between 25 and 34 under ANC and on average the total number of children born between the age range was 859 per 1,000 women.

9 We selected 1962 birth cohort as the upper limit because completed fertility levels of 1963 and younger cohorts were not actual results but projections.

Then we use completed fertility level data to estimate the permanent impact of fertility (See Figure 3 and Table 4-6). Results indicate that there is little ANC impact on completed fertility.

Table 3 presents regression results of equation (1). It reports the ANC impact coefficient of three sub samples by age group and the ANC coefficient of a pooled sample. We test if birth probability of different age group is differently affected by ANC. From Table 3, ANC impact varies by age group. The birth subsidy impact on fertility is significant and positive for the two younger cohorts; however, it is not significant for the oldest cohort. In the pooled regression, the impact of ANC on the youngest cohort is 6.6 percent and it is 4.2 percent for the second youngest cohort. The impact is 1.1 percent for women older than 35. As ANC impact varies by age group and there is strong evidence that we need age-specific measure of ANC impact on fertility.

Completed fertility level of Quebec is consistently below completed fertility level of the rest of Canada. Completed fertility level of Quebec slowly and consistently declines from 3.02 in 1934 birth cohort to 1.61 in 1965 birth cohort. Completed fertility level of the rest of Canada also consistently declines from 2.38 in 1944 birth cohort to 1.63 in 1962 birth cohort. Completed fertility levels of both Quebec and rest of Canada seem to move concurrently with each other and age adjusted exposure to ANC does not seem to affect the pattern of Quebecois completed fertility level differently from completed fertility level of rest of Canada.

Linear regression results from equation (2) are reported in Table 4. Models in panel (A) take the completed fertility level of Quebec as the dependent variable and age-adjusted exposure to ANC, completed fertility level of rest of Canada, linear and squared cohort year variables as the independent variables. Age-adjusted exposure to ANC is statistically insignificant for all models. We include completed fertility level of rest of Canada as independent variable as a control for overall trend in Canadian completed fertility level that may be incidentally correlated with ANC impact. As seen in Figure 3, analysis summarized in panel (A) indicates that ANC does not have significant correlation with completed fertility level of Quebec.

We then tested if the model is robust to the measure of ANC impact. Instead of using age-adjusted exposure to ANC as a proxy for ANC impact, we tried the number of childbearing years each cohort spent while ANC is implemented. Childbearing age used is 15-44, as total fertility rate of a given year is measured as the total number of children that would be borne by a typical

woman in a country if she is to speed through age 15 to 44 during the year. Panel (B) in Table 4 shows that the use of alternative measure as ANC impact has little impact on the result. In all three models, completed fertility level of Quebec is the dependent variable, and they progressively take number of childbearing years spent under ANC, completed fertility of rest of Canada, cohort birth year and its quadratic term as independent variables. As in panel (A), ANC impact does not have a significant impact on completed fertility. It is only significant in model (A) but as we introduce cohort birth year as time trend, the significance disappears. Therefore it seems that the correlation is robust to the use of ANC impact measure.

We estimate equation (3), taking completed fertility levels of both Quebec and the rest of Canada as dependent variables. The model takes age-adjusted exposure to ANC, cohort birth year, its quadratic term and Quebec indicator variable as independent variables. Age-adjusted exposure to ANC was assumed to be zero for the rest of Canada regardless of cohort birth year. From panel (C) in Table 4 presents the estimation result of equation (3). The results indicate that age-adjusted exposure to ANC is significant in model (2) only. However, model (2) implicitly assumes that Quebec and the rest of Canada have identical time trend. We introduce Quebec specific time trend dummy variable in model (3), the interaction terms between Quebec dummy variable with linear and quadratic cohort year variables and the significance disappears. Thus, panel (C) shows that age-adjusted exposure to ANC does not have statistically significant impact on fertility level of Quebec.

In theory, costly cash transfer schemes that reduces childrearing cost may have a positive impact on fertility (Becker 1960). However, if the subsidy amount is substantial enough to have permanent impact on fertility is an empirical question. It depends on the number of households at the margin whose lifetime fertility is affected by the cash transfer amount. Assuming that the utility of a child is diminishing in the number of children and the cost of childrearing is constant over the parity of births, cash subsidy may not be enough to increase the total number of lifetime births. Instead, for households with borrowing constraints, cash subsidy may only be enough for them to have a child that they are saving up for earlier. Therefore, whether the subsidy is substantial enough to encourage households to increase the total number of children is an empirical question, as children are discrete and expensive.

The mechanism is formally illustrated in a simple two-period fertility decision model with liquidity constraint in Parent and Wang (2007). Assuming price of a child is identical over the period and also assuming that utility from the first child exceeds the price of a child, households bound by liquidity constraint in the first period would be able to have a child in the first period. However, whether the household would have another child in the second period depend on if the size of child benefit is sufficient to make the utility from the second child greater than the price of a child. If the child benefit is insufficient to increase lifetime fertility, it merely has temporal effect in the timing of birth. Using difference-in-difference analysis on household level Census data, they also show that the impact of reformed Family Allowance program of Canada in the mid-1970s indicated in Zhang et al. (1994) is actually temporal, emphasizing that the lack of permanent effect is an empirical issue. This means that ANC may not be substantial enough to have a permanent impact on fertility either.

Analysis of the age-adjusted exposure to ANC and completed lifetime fertility level of Quebec shows that ANC impact is not permanent. ANC cash transfer amount did not affect significant number of households at the margin such that their lifetime fertility is affected by the subsidy amount. The evidence implies that significant number of households who are not at the margin shifted the timing of births in response to ANC.

5 Concluding Remarks

The Allowance for Newborn Children (ANC) from Quebec, Canada is a fiscal incentive scheme to stimulate birth; it has a positive and significant impact on fertility. However, ANC impact may be due mainly to the shift in the timing of childbirth and not to the increase in lifetime fertility level. The permanent impact of ANC is more accurately tested by using completed fertility level of female birth cohort. It may be more accurate to estimate the permanent impact of pro-natal cash transfer by analyzing the impact on completed fertility level rather than cross-sectional dataset as it was previously done, for the transfer may have statistically significant temporal shift in birth timing as well. Although there is mechanical link between fertility level and childrearing costs, the subsidy amount must be substantial enough to permanently influence enough households who are willing to increase their lifetime fertility because children are innately discrete and expensive. The ANC subsidy amount relative to the total childrearing cost seems

insufficient to increase the total lifetime fertility of affected households and the cash transfer policy have little impact on the lifetime fertility increase.

Childrearing is costly hence cash transfer schemes to reduce childrearing cost are costly as well. For example it costs almost C$154,000 to raise a child from birth to the age of 18 in Canada according to the Canadian Council of Social Development. Based on survey by the U.S. Department of Agriculture using the data from the Consumer Expenditure Survey by the U.S. Department of Labor, it costs from C$124,800 to C$250,260 to raise a child from birth to the age of 18, depending on the income level and the living arrangements of the parents. Using the method highlighted in Phipps (1998), ANC transfer amount accounts for 1.3 percent, 3.2 percent and 30.1 percent of direct cost of children (Duclos, Lefebvre, and Merrigan (2001)). Cost of children also has indirect economic costs. It affects savings, consumption and labor supply decision of a household (Browning 1992) hence ANC transfer amount may be smaller than the estimate if indirect economic costs are accounted for. This paper shows that cash transfer of such magnitude is not substantial enough to increase completed fertility level but it may only shift the timing of births of the affected population.

All OECD countries except for Turkey and Mexico has above replacement level of fertility (OECD 2005) and all OECD countries implement pro-natal policies in one form or another (Sleebos 2003). Cash transfer scheme is a popular policy choice in many OECD countries spanning over different continents, including Australia, Belgium, France, Germany, New Zealand, South Korea and Sweden, while long run impact of the cash transfer has not been fully tested. This may be due to ease of monitoring, ease of implementation and political decision making. However, if future studies with more completed fertility level data, as they become available, also reveal that long run impact of cash transfer is limited, immigration may be an alternative solution for policymakers genuinely concerned about decreasing national income, productivity and rising burden on government budget due to the current fertility transition of developed countries.

REFERENCES

Baril, R., Lafebvre, P., Merrigan, P. (2000). "Quebec Family Policy: Impact and Options," *The Institute for Research on Public Policy (IRPP)*, 6(1), pp.4-31

Becker, G.S. (1960). "An Economic Analysis of Fertility," *Demographic and Economic Change in Developed Countries*, NBER Series, 11. Princeton, NJ: Princeton University Press, pp.209-231.

Becker, G.S., Barro, R.J. (1988). "A Reformulation of the Economic Theory of Fertility," *The Quarterly Journal of Economics*, 103(1), pp.1-25.

Becker, G.S., Murphy, K.M., Tamura, R. (1990). "Human Capital, Fertility, and Economic Growth," *The Journal of Political Economy*, 98(5), pp.S12-S37.

Becker, G.S., Murphy, K.M., Tamura, R. (1990). "Human Capital, Fertility, and Economic Growth," *The Journal of Political Economy*, 98(5), pp.S12-S37.

Browning, M. (1992). "Children and Household Economic Behavior," *Journal of Economic Literature*, 30(3), pp.1434-1475.

Buttner, T., Lutz, W. (1990). "Estimating Fertility Responses to Policy Measures in the German Democratic Republic," *Population and Development Review*, 16(3), pp.539-555.

Cohen, A., Dehejia, R., Romanov, D. (2007). "Do Financial Incentives Affect Fertility?" *NBER Working Paper 13700*.

Duclos, E., Lefebvre, P., Merrigan, P. (2001). "A Natural Experiment on the Economics of Storks: Evidence on the Impact of Differential Family Policy on Fertility Rates in Canada," CREFE Working Paper, No. 136.

Gauthier, A.H., Hatzius, J. (1997). "Family Benefits and Fertility: An Econometric Analysis," *Population Studies*, 51(3), pp.295-306.

Heckman, J., and Walker, J. (1990). "The Relationship between Wages and Income and the Timing and Spacing of Births: Evidence from Swedish Longitudinal Data," *Econometrica*, 58(6), pp.1411-1441.

Hoem, J.M. (1990). "Social Policy and Recent Fertility Change in Sweden," *Population and Development Review*, 16(4), pp.735-748.

Milligan, K. (2005). "Subsidizing the Stork: New Evidence on Tax Incentives and Fertility," *The Review of Economics and Statistics*, 87(3), pp.539-555.

OECD. (2005). *Trends and Determinants of Fertility Rates in OECD Countries: The Role of Policies*, OECD Social, Employment and Migration Working Papers..

Parent, D., and Wang, L. (2007). "Tax Incentives and Fertility in Canada: Quantum vs Tempo Effects," *The Canadian Journal of Economics*, 40(2), pp.371-400.

Salanie, B., Laroque, G. (2005) "Does Fertility Respond to Financial Incentives?" Working Paper.

Sleebos, J. E. (2003). *Low Fertility Rates in OECD Countries: Facts and Policy Reponses*, OECD Social, Employment and Migration Working Papers.

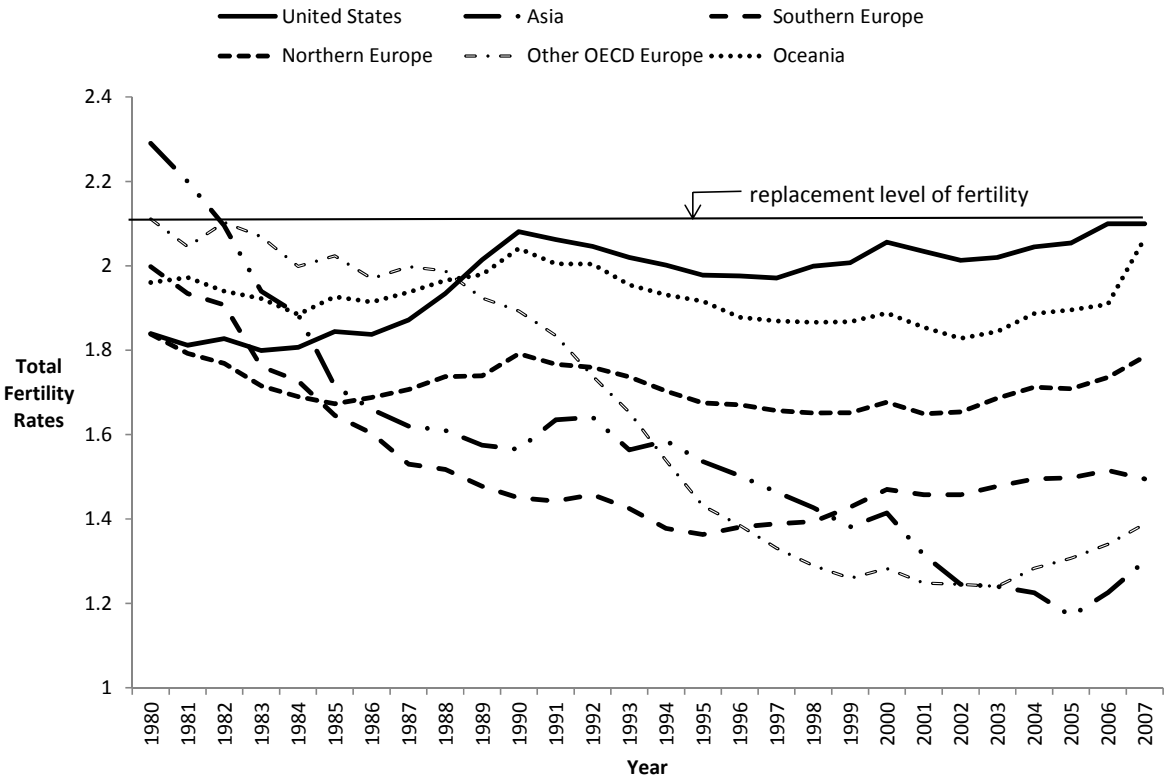
Statistics Canada, "Canadian Socio-Economic Information Management System (CANSIM)," various years.

Walker, J. (1995). "The Effect of Public Policies on Recent Swedish Fertility Behavior," *Population Economics*, 8, pp.223-251.

Witt, J.C., Wagner, G.G. (1995). "Declining Fertility in East Germany After Unification: A Demographic Response to Socioeconomic Change," *Population and Development Review*, 21(2), pp.387-397.

Zhang, J., Quan, J., and Van Meerbergen, P. (1994). "The Effect of Tax-Transfer Policies on Fertility in Canada, 1921-88," *Journal of Human Resources*, 29(1), pp.181-201.

Figure 1: Total Fertility Rates of OECD Countries from 1980 to 2007



Source: OECD Statistics (http://stats.oecd.org/Index.aspx).

Note: Asia includes Japan and South Korea. Southern Europe includes France, Italy, Portugal and Spain. Northern Europe includes Austria, Belgium, Denmark, Finland, Germany, Iceland, Ireland, the Netherlands, Norway, Sweden, Switzerland and the United Kingdom. Other OECD Europe includes Czech Republic, Estonia, Hungary, Poland, Slovak Republic and Slovenia. Oceania includes Australia and New Zealand

Figure 2: Census and ANC Timing

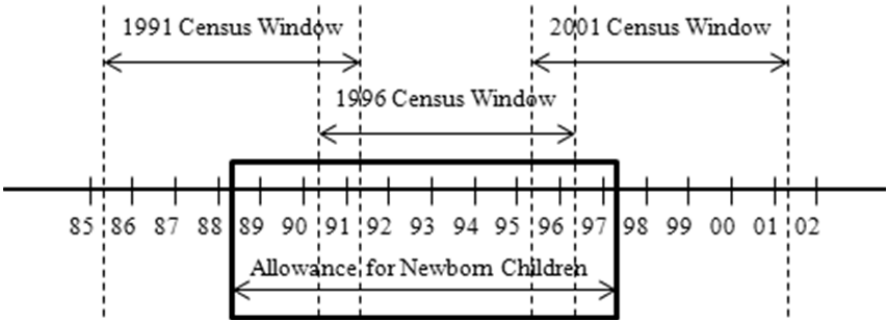
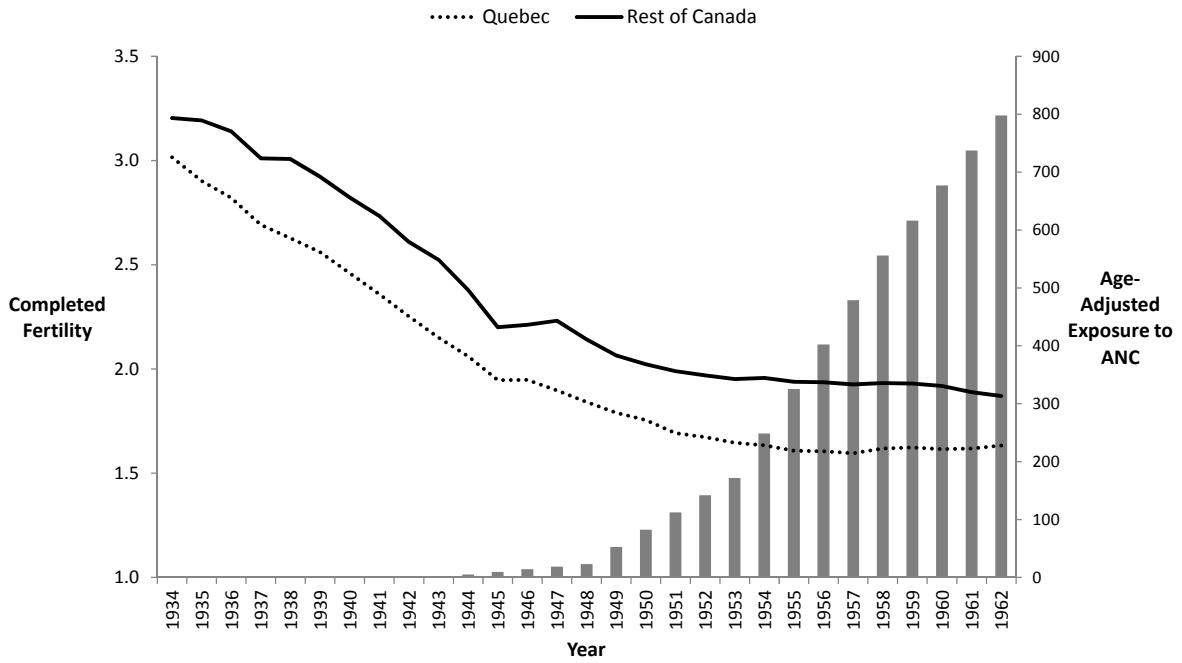


Figure 3: Age-Adjusted Exposure to ANC per Cohort and Completed Fertility Levels of Quebec and the Rest of Canada by Birth Year (1944-1965)



Notes: Age-adjusted exposure to ANC was estimated by summing the average annual age-specific fertility rate of Quebec from 2000-2005 (Source: CANSIM database Table 102-4505) for the age at which each cohort was affected by ANC. The completed fertility of the rest of Canada was estimated by subtracting population-weighted completed fertility rate of Quebec from completed fertility rate of Canada per cohort (Source: Statistics Canada data table 91-209X for completed fertility of Canada (http://www.statcan.gc.ca/pub/91-209-x/2011001/article/11513/figures/desc/desc05-eng.htm), Institut de la Statistique Quebec for completed fertility of Quebec, CANSIM database Table 051-0001 and Canada Yearbook for population of Canada and Quebec from 1949 to 2006, for every five years). Completed fertility levels of 1963-1978 cohorts were also available but they were projections hence we only used real data up to 1962 birth cohort.

Table 1: Summary of Short Term Policy Evaluation Studies

France (Salanie 2005)				
Estimated Impact on Fertility by Parity			Program Description	Data Used
1st	2nd	3rd	- Size: ~0.8% of GDP	French Labor Force Survey (1997-1999)
2.20% (up 1.1%)	6.70% (up 2.0%)	9.00% (up 1.8%)	1) Unconditional Transfer 2) Income based Transfer 3) Employment based Transfer (Increasing in parity of Birth)	

Israel (Cohen, Dehejia, and Romanov 2008)			
Estimated Impact on Fertility		Program Description	Data Used
Average Increase in Fertility 0.80% Increase in Fertility per Dollar 0.01%		- Size: ~1.5% of GDP in 2000 - Monthly Child Allowance - Increasing in Parity of Birth - Reduced by 2003 Reform	Israeli Central Buraeu of Statistics (1997-2005)

Canada, Quebec (Milligan 2005)				
Estimated Impact on Fertility by Parity			Program Description	Data Used
1st	2nd	3rd	- CDN$1.36bn over ten years	Canadian Census (1991, 1996)
10.70% (up 4.5%)	12.60% (up 8.0%)	25.00% (up 8.2%)	- One-time Cash Transfer (Increasing in Parity of Birth up to third child)	
Overall				
12.0% (up 5.3%)				

Table 2.—Benefit Payments under the Allowance for Newborn Children

Period	First Child	Second Child	Third or Higher Child
May 1988 to April 1989	C$500 at birth	C$500 at birth	8 quarterly payments of C$375 = C$3,000
May 1989 to April 1990	C$500 at birth	C$500 at birth, C$500 on 1st birthday	12 quarterly payments of C$375 = C$4,500
May 1990 to April 1991	C$500 at birth	C$500 at birth, C$500 on 1st birthday	16 quarterly payments of C$375 = C$6,000
May 1991 to April 1992	C$500 at birth	C$500 at birth, C$500 on 1st birthday	20 quarterly payments of C$375 = C$7,500
May 1992 to September 1997	C$500 at birth	C$500 at birth, C$500 on 1st birthday	20 quarterly payments of C$400 = C$8,000

Source: Milligan (2005)

Table 3: Regression Results by Female Age Groups

Independent Variables	Age Group			Pooled	Independent Variables	Age Group			Pooled
	15-24	25-34	35 and over			15-24	25-34	35 and over	
15-24 X Quebec X 1996 dummy	0.039**	-	-	0.066***	*Female university degree*	-0.285***	-0.080***	0.062***	0.014***
	(0.016)			(0.011)		(0.014)	(0.006)	(0.002)	(0.002)
25-34 X Quebec X 1996 dummy	-	0.050***	-	0.042***	*Male age 25-34*	0.107***	0.152***	0.348***	0.160***
		(0.007)		(0.005)		(0.008)	(0.009)	(0.004)	(0.003)
35 and over X Quebec X 1996 dummy	-	-	0.008***	0.011***	*Male age 35-44*	0.103***	0.122***	0.175***	0.123***
			(0.002)	(0.003)		(0.021)	(0.009)	(0.003)	(0.003)
15-24 X Quebec	-	-	-	-0.113***	*Male age 45+*	-0.083*	-0.076***	-0.050***	-0.111***
				(0.008)		(0.046)	(0.007)	(0.003)	(0.003)
25-34 X Quebec	-	-	-	-0.004	*Male immigrant*	-0.068***	0.013*	0.005***	0.010***
				(0.004)		(0.016)	(0.007)	(0.002)	(0.002)
15-24 X 1996 dummy	-	-	-	-0.092***	*Male Francophone*	-0.324***	-0.084***	-0.015***	-0.030***
				(0.006)		(0.018)	(0.009)	(0.003)	(0.003)
25-34 X 1996 dummy	-	-	-	-0.028***	*Male Anglophone*	-0.289***	-0.076***	-0.011***	-0.029***
				(0.003)		(0.013)	(0.007)	(0.002)	(0.002)
Female age 15-24	-	-	-	0.284***	*Male high school*	-0.062***	0.004***	0.0001	0.001
				(0.004)		(0.010)	(0.005)	(0.002)	(0.001)
Female age 25-34	-	-	-	0.315***	*Male post-high school*	-0.084***	0.018***	0.011***	0.011***
				(0.002)		(0.009)	(0.005)	(0.001)	(0.002)
1996 dummy	-0.005	-0.015***	-0.002	0.007***	*Male university degree*	-0.131***	0.024***	0.043***	0.041***
	(0.011)	(0.005)	(0.001)	(0.002)		(0.014)	(0.006)	(0.002)	(0.002)
Quebec	-0.038**	-0.0004	0.013***	0.013***	*Married*	0.118***	0.035***	0.012***	0.026***
	(0.017)	(0.008)	(0.002)	(0.003)		(0.027)	(0.011)	(0.004)	(0.004)
One Older Child	0.120***	0.104***	0.025***	0.047***	*Lives in urban area*	-0.064***	-0.044***	0.012***	-0.006***
	(0.018)	(0.004)	(0.001)	(0.001)		(0.007)	(0.004)	(0.001)	(0.001)
Two or More Older Child	0.121**	-0.267***	-0.069***	-0.094***	*Family income (C$10000)*	-0.332***	-0.091***	-0.006***	-0.011***
	(0.048)	(0.005)	(0.001)	(0.001)		(0.018)	(0.006)	(0.001)	(0.002)
Female immigrant	0.097***	0.043***	-0.004**	0.006***	*Provincial GDP growth*	0.014**	0.021***	0.005***	0.009***
	(0.017)	(0.007)	(0.002)	(0.002)		(0.007)	(0.003)	(0.001)	(0.001)
Female Francophone	0.120***	-0.008	-0.034***	-0.027***	*Provincial migration rate*	-0.045***	-0.047***	-0.002	-0.015***
	(0.022)	(0.010)	(0.003)	(0.003)		(0.010)	(0.005)	(0.002)	(0.002)
Female Anglophone	0.125***	0.002	-0.014***	-0.004	*Provincial education spending*	0.001	0.023***	0.-11***	0.013***
	(0.017)	(0.007)	(0.002)	(0.002)	*(C$1000)*	(0.007)	(0.004)	(0.001)	(0.001)
Female high school	-0.087***	0.014**	0.005***	0.008***	Observations	16,791	85,245	268,968	371,004
	(0.010)	(0.005)	(0.001)	(0.002)					
Female post-high school	-0.180***	-0.009*	0.022***	0.008***	Adjusted R^2	0.194	0.077	0.181	0.333
	(0.009)	(0.006)	(0.001)	(0.002)					

Dependent Variable: Had at least one child during the 5-year Census window.

Notes: This analysis is identical to the model specified in equation (1). The age cohort variables and important dummy variables are reported: '*15-24 X Quebec X 1996 dummy*' indicates the dummy variable for households with female age 15-24 in the presence of the ANC, '*25-34 X Quebec X 1996 dummy*' indicates the dummy variable for households with female age 25-34 in the presence of the ANC and '*35 and over X Quebec X 1996 dummy*' indicates the dummy variable for households with female age over 35 in the presence of the ANC. Standard errors are reported in parenthesis. *** indicates significance at 1% level, ** indicates significance at 5% level and * indicates significance at 10% level

Table 4: Age-Adjusted ANC Exposure Impact on Completed Fertility

	(1)	(2)	(3)
Panel A: Dependent Variable - Completed Fertility of Quebec			
Age-adjusted exposure to ANC (per 1,000 women)	0.00002 (0.00004)	0.00076*** (0.00016)	-0.00008 (0.00010)
Completed Fertility of Rest of Canada	0.99133*** (0.02385)	0.40181*** (0.12744)	0.38039*** (0.05068)
Cohort Birth Year		-0.05028*** (0.01076)	-7.15645*** (0.61326)
Cohort Birth Year Squared			0.00183*** (0.00016)
Observations	29	29	29
Adjusted R^2	0.991	0.995	0.999
Panel B: Dependent Variable - Completed Fertility of Quebec			
Number of Childbearing Years (15-44) Spent under ANC	0.00326 (0.00425)	0.00719 (0.00590)	0.00058 (0.00183)
Completed Fertility of Rest of Canada	1.01124*** (0.04081)	0.98123*** (0.05142)	0.35848*** (0.04218)
Cohort Birth Year		-0.00374 (0.00389)	-6.74992*** (0.42504)
Cohort Birth Year Squared			0.00172*** (0.00011)
Observations	29	29	29
Adjusted R^2	0.991	0.991	0.999
Panel C: Dependent Variable - Completed Fertility Level of Quebec and the rest of Canada (pooled sample)			
Age-adjusted exposure to ANC (per 1,000 women)	-0.09844 (0.12362)	-0.32126*** (0.01570)	0.00013 (0.00010)
Quebec Dummy	Yes	Yes	Yes
Time Trend Dummy	No	Yes	Yes
Quebec Specific Time Trend Dummy Variables	No	No	Yes
Observations	58	58	58
Adjusted R^2	0.258	0.990	0.990

Note: The analysis in panel (A) is identical to the model specified in equation (2). For the analysis presented in panel (B), we replaced the measure of ANC impact with the number of years spent under ANC during birth years of 15-49. The analysis in panel (C) is identical to the model specified in equation (3). The *time trend dummy* variables in panel (C) are the cohort birth year and its quadratic term. *Quebec specific time trend dummy* variables are the interaction term between Quebec dummy variable and cohort birth year and its quadratic term. Standard errors are reported in parenthesis. *** indicates significance at 1% level, ** indicates significance at 5% level and * indicates significance at 10% level.