Lund University
Department of Economic History
Master Programme in Economic Demography

The Impact of Indirect Cost-Reducing Family Policy on Fertility in Canada

Josephine Jacobs

EKHR01
Master's thesis (15 credits ECTS)
Spring 2009

Supervisor: Maria Stanfors

Abstract

Fertility declines have been taking place across Canada in a number of different provincial family policy contexts since the 1960's. Although previous studies have assessed the impact of direct cost-reducing family policies in Canada, there is no body of work measuring the impact of indirect cost-reducing family policies across the county. The objective of this paper is to determine whether provincial variations in indirect cost-reducing family policy impact fertility. This paper uses provincial unpaid job-protected parental leave lengths as a proxy for indirect cost-reducing family policy contexts. Comparing multivariate and bivariate statistical analyses, I assess the impact of these policies on TFR by province and year from 1976 to 2006, controlling for male income, unemployment, female earnings, female labour force participation, and relative cohort size. It is determined that a positive correlation exists between fertility and unpaid job-protected leave, but whether this is a causal relationship is indeterminate.

Keywords: fertility, family policy, parental leave, Canada

.

Table of Contents

1. Introduction

1.1. Fertility Trends Since the 1960's

Since the 1960's, there have been dramatic decreases in fertility rates across the developed world. This drop in fertility rates has affected population ageing and workforce composition, which in turn has created a new potential for economic woes in the coming decades. In most developed countries, the coupling of increases in life expectancy with declines in fertility has meant that the dependency ratio – the ratio of children and elderly, or dependents, to working age members – has increased significantly over time. For welfare states that have public pension schemes and burgeoning health care costs, this change in the population structure has been worrisome. It implies that fewer and fewer people will be shouldering increasingly high costs.

In the 1990's, one of the key indices of fertility, the total fertility rate (TFR) hit lows that had yet to be seen in formerly high fertility countries. The TFR, which is the most widely used index of fertility, is an important predictor of future population growth. It measures the total number of children that a woman will have in her lifetime given that she survives until her fiftieth birthday (Hinde, 2007, pp.100).[1] A TFR of 2.1 is considered replacement level fertility, whereby a population exactly replaces itself from one generation to the next, given constant mortality rates (Hinde, 2007, pp.222). As can be seen in Figure 1, since the 1980's, the OECD average TFR has been below replacement level. The Canadian TFR has consistently remained below the OECD average.

A number of factors have contributed to these fertility declines. In economic terms, as women in developed nations have attained higher educational levels, higher earnings, and increased labour force participation rates in relation to men, the opportunity cost of having children has increased. In tandem with this have been sociological and attitudinal changes: women's growing career aspirations have diminished the importance of having children relative to starting a career. As women's career paths have developed and the prevalence of two-earner families increased, there has been a growing incompatibility between work and family life (van de Kaa, 2002, pp.6).

[1] TFR is not without drawbacks when used as a predictor for future population growth. As Sobotka (2004, pp.213) demonstrates, the tempo-adjusted indicator of TFR (cohort total fertility rates) may be a more accurate measure of current fertility, as it takes into account delays in childbearing that many countries are undergoing.

Further to this, economic uncertainties, especially since the 1990's, have made many young people hesitant to start families. These factors have led to the increasing postponement of childbearing and the choice to have fewer children in developed countries (d'Addio, 2005, pp.27).

Though these factors undoubtedly impact fertility, the exact effect that they have on the aggregate total fertility rate is less clear. Prior to the 1990's, there was a negative correlation between fertility rates at the aggregate level and female labour force participation and education rates (Kohler, 2006, pp.15). Since the 1990's, these correlations have become positive. One possible explanation for this reversal revolves around institutional arrangements, such as family policy, that make child rearing and female labour force participation more compatible in some countries than in others (Brewster, 2000, pp.271).

This explanation for the reversal in correlations should especially be of interest to policy makers hoping to use family policies to stem fertility declines. Traditionally, family policy has been interpreted in economic terms, through tax breaks, direct cash transfers, or parental benefits. These policies aim to decrease direct costs of childrearing. However, countries that have successfully reversed fertility decline trends in recent decades, such as Sweden and France, have also acknowledged the importance of sociological determinants of fertility. Policies that promote gender equity and ease work-life balance, such as job-protected parental leaves and child care provision, have become increasingly important (d'Addio, 2005, pp.70). This more holistic approach to family policy has arguably been successful in these countries.

In Canada, the various provinces have approaches to family policy that range from the more traditional to the more holistic. Some provinces have opted to focus mainly on financial components of family policy through tax breaks and cash transfers. Others, however, have attached equal importance to parental leave policies and child care accessibility. It remains to be seen whether the provinces' respective approaches to family policy have impacted their ability to stem fertility declines.

1.2. Research Problem

In this paper, I focus on fertility rates because of the growing importance of declining fertility rates in Canada. As the Canadian welfare state has developed, family policy has become a key component of Canadian social policy. A variety of family policies to help parents balance work life with child bearing and child rearing have been adopted in each of the Canadian provinces. To determine whether these policies can impact fertility rates, controlled analyses must be conducted. Previous Canadian studies by Phipps (2000) and Hyatt (1991) have focused on the impact of parental monetary leave benefits on fertility. Milligan (2001) and Duclos (2001) looked at Quebec's baby bonuses, universal allowances, and tax credit policies, while Duclos (2000) has looked at tax exemptions and cash transfers across the country.

No studies, however, have been undertaken assessing the impact on fertility of policies that lower indirect costs of childbearing, such as unpaid job-protected parental leave length.[2] Unpaid job-protected parental leave policy is not necessarily implemented to impact fertility rates, but it is an important means of lowering the opportunity cost of child bearing for working parents. The impact of differential unpaid job-protected parental leave policies across Canada is the focus of my study.

1.3. Aim and scope

The focus of this paper is on fertility rates. As a primary objective, given both the interprovincial differences in TFRs and in provincial parental leave policies, I investigate whether and to what extent cross-Canada TFRs are influenced by unpaid job-protected leave policies at the macro level from 1976 to 2006.

1.4. Outline of the thesis

The paper will begin with background information about the Canadian pan-provincial fertility, social policy, and family policy contexts in Section 2. Section 3 provides overview of previous research on the impact of various family policies on fertility. The theoretical framework for my model and my hypotheses are also outlined in this section. In Section 4, I explain the data,

[2] No work has been done on the impact of child care policies on fertility, largely due to the lack of available data on child care policy across the country.

methods, and model that will be used to test my hypotheses. Section 5 provides the results of my statistical analysis and a discussion of how these results relate to my research question and previous research. Finally, I conclude the paper in Section 6 by summarizing the key findings with regards to the research question and outlining implications for future research.

2. Background: The Canadian context

Canada has a population of 33.5 million, and is comprised of 10 provinces and three territories. As the second largest land mass in the world, with a comparatively small population that is heavily concentrated in a few key areas, there are substantial variations in demographic, economic, sociological, and political factors. Figure 2 shows the varied population density throughout the country. Meanwhile, Table 1 demonstrates the wide economic spectrum in the country with 2007 GDP per capita figures. The economic spectrum ranges from the oil-rich Alberta and industry-heavy Ontario to the comparatively smaller economies of the Maritime Provinces, Newfoundland, New Brunswick, Prince Edward Island, and Nova Scotia. In the following section, I will give a brief overview of fertility trends across Canada since the 1970's and then provide some background on the Canadian social policy and, more specifically, family policy context.

2.1. Canadian Fertility Trends Since the 1970's

Canada is no exception to the declining TFR trend in other developed countries. As can be seen in Figure 1, Canada's TFR has remained consistently lower than the OECD average. Recent convergence with the OECD average has more to do with the OECD countries' more rapid TFR decline than a reversal of the decline in Canada. Within Canada there is a great deal of inter-provincial TFR variation. British Columbia and the Central Canadian provinces of Ontario and Quebec constitute one fertility pattern that is distinct from that of the Prairie Provinces of Alberta, Saskatchewan, and Manitoba. Meanwhile, the Maritime Provinces, Nova Scotia, Newfoundland, New Brunswick, and, Prince Edward Island, have their own unique fertility patterns.

Figure 3 shows the TFR developments in the Prairie Provinces since 1976. The Prairie Provinces have exhibited comparatively higher TFRs than the Canadian average since 1976. All

three provinces started the period at or above replacement level. However, unlike Alberta, Saskatchewan and Manitoba, have managed to maintain significantly higher TFRs than the national average from the 1990's onwards, each at 1.9 children per woman. The TFR in Alberta, though not as high as the other two provinces, is still significantly higher than the national average, and has experienced a more pronounced rebound since 2000.

Figure 4 shows the TFR developments in Central Canada and British Columbia since 1976. In Central Canada, Ontario has been fairly consistent with the national average. Meanwhile Quebec has experienced huge fluctuations, dipping to extreme lows in the 1970's and 1980's, until a rebound to around the national average in 1990. It remained lower than the national average until 2005, when it surpassed both Ontario and the Canadian average. Both of these provinces have experienced a rebound in TFR since around 2000, after a decade of relatively steady declines. Quebec's TFR trends are notable due to the lows that were reached in 1987 (1.37 children per woman) and 2000 (1.42 children per woman). It has experienced a significant rebound since 2000, having reached 1.62 in 2006. This is comparable to Ontario's much more modest rebound from 1.48 to 1.52 children per woman. Meanwhile, British Columbia has followed a similar trend to Ontario. Its TFR has been significantly lower than the national average, reaching a low of 1.38 in 2000. British Columbia has not rebounded, and appears to have stabilized around the 1.4 level since 2000.

Finally, I look at the Maritime Provinces. Figure 5 shows TFR developments in these provinces since 1976. The Maritimes' TFRs have generally been lower than the national average from 1980 onwards, with the exception of Prince Edward Island. There have been greater TFR fluctuations in these provinces, likely due to their smaller size relative to the other Canadian provinces. Further, the TFR rebound since 2000 has been less pronounced in these provinces than the Canadian average. One striking observation about the Maritime Provinces is that three of these four provinces have either reached or were close to reaching the lowest-low level of fertility, which Kohler et al. (2002) define as 1.3. At this level, there is an annual decline of the population size by 1.5 percent in a stable population with a mean age of women at childbirth of 30 years (Kohler, 2002, pp.642). British Columbia and Quebec are the only other provinces in Canada to have almost reached this level.

2.2. The Canadian Social Policy Context

As a federalist state, policy formulation in Canada is much more decentralized than in other countries. There are three basic models of federalism governing policy formulation in Canada: classic federalism, shared costs federalism, and joint-decision federalism. With classical federalism, programs are run exclusively by one level of government. These include unemployment insurance, child benefits, and non-contributory old age pension funds at the federal level and worker's compensation at the provincial level (Banting, 2005, pp.9). Shared cost federalism involves the federal government financially supporting provincial programs with specific terms. This includes health care funding. Finally, joint-decision federalism requires formal approval by both provincial and federal levels of government before any action can take place, such as the Canada Pension Plan (Banting, 2005, pp.9).

The history of the Canadian welfare state begins much later than in a number of other nations, including the United States and Australia (Banting, 2005, pp.10). The post-World War II period saw the most substantial movement towards a federally directed welfare state. During this period, a system of "fiscal federalism" developed, whereby a number of both universal and means-tested social assistance programs were supported by the federal government. These programs included the introduction of Unemployment Insurance in 1941, the Universal Family Allowance in 1945, a universal and federal old age pension in 1951, and the Canadian Medicare program in the 1950's and 1960's (Baker, 1997, pp.7). The ideological basis of the post-war welfare state was the alleviation of regional disparities and universality (Baker, 1997, pp.4).

The tight federal reign of the post-World War II period was loosened substantially in the 1960's. In its quest for cultural sovereignty within Canada, Quebec would help to move Canada away from a centralized federalist state. Quebec's successful push for more autonomy in creating its policies set off a general push back effect amongst all the provinces, and the 1960's saw the emergence of a semi-centralized federalist state. Whereas programs enacted in the 1940's and 1950's tended to give Ottawa the dominant role, policies introduced from the 1960's onwards gave more scope to provincial governments (Banting, 2005, pp.17).

From the 1960's until the mid-1990's, the Canada Assistance Plan (CAP) was in place. CAP was a federal cost sharing program whereby the federal and provincial governments split the cost

for social programs 50/50 (Collier, 2007, pp.12). However, the 1990's was yet another landmark decade for social policy in Canada. During the early 1990's, the Conservative Party was in power and an ideological transformation took place, as political focus shifted to market capitalism and economic globalization. As Banting (2005, pp.27) outlines, globalization for Canada meant more integration with the United States through the 1992 signing of the North American Free Trade Agreement (NAFTA). It also meant a louder conservative voice in the Canadian political arena. Instead of a focus on universality, the welfare state became centered on need and work incentives (Baker, 1997, pp.4). In this era of budget tightening, CAP was replaced by the Canada Health and Social Transfer (CHST) in 1996.

The CHST combined CAP funding with health care transfers and reduced the overall transfer amount. This program also gave much more discretion to the provinces in deciding how to allocate this funding between health costs and other social services. The key point here is that since the CHST was introduced, social programs, such as family policy, have come into direct competition with escalating health costs for their budgets (Collier, 2007, pp.12). With fewer constraints tied to CHST funding, it has become increasingly apparent how each province prioritizes various social policies.

As alluded to above, the social policy context within each province is unique. From the 1960's, as provinces were given a more powerful voice, ideological differences between the provinces have been increasingly apparent. The traditional "have" provinces, Ontario, British Columbia, and Alberta, so called due to their larger economies, have tended to take a more conservative approach towards social policy. The conservative approach is characterized by the minimal interventionist mentality. This attitude was demonstrated in these provinces' opposition to universal health care in the 1950's and 1960's (Banting, 2005, pp.23). Saskatchewan, meanwhile, though similar to Alberta in industry, was the forefather of the universal health care system and more social democratic in its approach to the welfare state. Quebec has also been more social democratic in its social policy scope, and has viewed social policy as an important tool in creating its distinct society (Banting, 2005, pp.6). The Maritime Provinces have largely been proponents for regional equalization, and have had fewer economic resources to devote to social policy. In the following section, I will see how these differences in attitudes towards social policy have played out for family policy across Canada, and in particular for leave policy.

2.3. Canadian Family Policy Context

As outlined, the federal and provincial governments are severally responsible for social policies, and the degree to which the federal government influences social policy varies. For some social services, such as health care, there is national legislation directing the policy framework that the provinces must take. Family policy, however, does not fall under a national directive, and the most prominent federal government impact on family policy is felt in the financial realm.

Family policy can be divided into benefits that help reduce the direct cost of childrearing and those that help to reduce indirect costs, for instance by easing the worker-parent conflicts that exist when parents are in the labour force. Direct cost-reducing policies in Canada include tax credits, tax benefits, tax exemptions, direct cash transfers, and parental leave benefits. Indirect cost-reducing policies include parental leave policies and policies that increase availability, accessibility, and quality of child care. The federal government and all provinces have instituted family policies to some degree. I will focus on parental leave policies in this paper. However, I also provide background on other aspects of family policy. Generosity with respect to one component of family policy is not always reflective of the entire family policy context in a province.

2.3.1. Direct Cost-Reducing Policies

The federal government has been responsible for fiscal deductions for children since 1918 and Family Allowances since 1945. Since their inception, these programs have changed dramatically. In 1993, during the aforementioned period of budget tightening, the Family Allowance program was abolished along with Non-Refundable Tax Credits. Instead, the Refundable Tax Credit remained and was renamed the Child Tax Benefit (CTB).[3] The CTB is an income-tested benefit and varies depending on the number of children in the family (Canada Revenue Agency, 2008, pp.8). The impact of the CTB is somewhat debatable when compared to similar programs in other countries. In a 2003 study, Mendelson found that among Canada, the United States, the United Kingdom, and Australia, four countries with similar child benefit programs, the Canadian CTB was the least generous program (Mendelson, 2003, pp.10).

[3] A Refundable Tax Credit is a tax credit that can reduce the tax owed below zero, resulting in a net payment to the taxpayer. The CTB is available to families with incomes under a cut-off of around $74,000.

Provincial governments also provide tax benefits and family allowances to eligible families, but these programs vary from province to province. *Finances Québec* conducted a cross-province comparison of these benefits programs in 2009, and the results of this comparison can be found in Table 2. The comparison takes into account family-benefit programs and refundable tax credits for families not receiving social assistance, as well as provincial grant tax reductions relating to children. The spectrum of family benefits across the country is substantial.

The most generous province is Quebec, which even on an international scale tops family friendly countries such as Finland, France, and Iceland for percentage of GDP spent on families (Finances Quebec, 2009, pp.5). Although British Columbia has a higher maximum monthly payment of $1,332, this payment is provided only to families who reach a much lower income threshold than Quebec. The two other "have" provinces in addition to British Columbia, Ontario and Alberta, have higher benefits than other provinces, but nowhere near the level of Quebec. The Maritime Provinces, along with Manitoba, have the lowest benefits with very low income ceilings as well.

2.3.2. Indirect Cost-Reducing Policies

In reviewing the indirect benefits across the country, I review policies that impact parental leave as well as policies that impact cost, accessibility, and quality of child care.[4] At the federal level, parental leave policies fall under the *Employment Insurance Act*. This implies that benefit levels are largely consistent across the provinces over time, with few exceptions. Until the early 1990's, parental leave benefits were significantly lower than in many other social welfare states around the world. From 1971 to 1984, job-protected leave was granted only to biological mothers for a minimum of 15 weeks under federal legislation. In 1984 federally legislated parental leave was introduced. This implied an additional 10 week period that could be taken by either the mother or the father of the child.[5] This ten week period was extended to 15 weeks in 1999 (Campbell, 2006, pp.181).[6]

[4] Policies surrounding parental benefit levels and child care costs are not strictly indirect cost-reducing measures, but are important complements to the leave length and child care access and quality policies. As such, they are included in the indirect-cost reducing policy section.
[5] Under the 1984 legislation, adopted parents also gained the right to this 10 week leave period.
[6] There are no conditions requiring maternity leave to be taken prior to the birth of a child; however, there is a two-week waiting period for benefits payment once an application has been received by the federal government.

In 2001, there were major legislative changes to the *Employment Insurance Act* which entitled parents to up to 50 weeks of partially compensated leave after the birth of the first child. The first 15 weeks are considered maternity leave for birth mothers only, while the remaining 35 weeks can be taken by either parent. The compensation level for this leave has been capped at 55 percent of income, as of 2004, with maximum insurable earnings of $42,300 (Campbell, 2006, pp.184).

Looking at the 2001 amendments from an international perspective, Canada is now more generous than the United Kingdom and the United States in terms of parental leave benefits, but falls short of the policies in other family friendly countries such as Sweden and France. Sweden, for instance, has allowed around 55 weeks of income-related benefits paying up to 80 percent of a parent's income and 13weeks of flat rate benefits to parents after the birth of a child.[7] Further, this time can be used flexibly until the child is eight (Grant, 2004, pp.124). In Europe in general, the wage replacement rate is around 70 to 80 percent for a minimum of one year (Campbell, 2006, pp.184).

At the provincial level, each province has its own employment standards legislation that must comply with the federal *Employment Insurance Act*. Although only Quebec has opted to top up the parental benefit level, the maximum unpaid parental leave length has been topped up to various degrees by different provinces. Table 3 shows the maternity, parental, maximum job-protected leave, and continuous employment requirements for each province in 2006. Again, Quebec has opted to provide a far lengthier job-protected parental leave than the rest of Canada, with 70 weeks of job-protected parental leave. In terms of compensation, Quebec provides 70 percent of earnings for 30 weeks and 55 percent of earnings for 25 weeks, with maximum insurable earnings of $62,000 as of 2009 (*Finances Québec*, 2009, pp.35). Manitoba is the only other province that has enhanced the minimum federal parental leave length, with 54 weeks of job-protected leave. The only compensation a person can receive on this leave, however, is the 55 percent paid into employment insurance.

The remaining provinces provide only the basic benefits required under the *Employment Insurance Act.* However, where most provinces allow either parent to take full advantage of the

[7] The actual leave lengths are 390 and 90 days respectively, but these have been divided by seven for comparability with the Canadian context.

parental leave, Alberta, New Brunswick, and Prince Edward Island cap the combined length of parental leave at 37 week for the first two provinces and 35 weeks for Prince Edward Island. All provinces except for Quebec and Manitoba cap the combined maternity and parental leave at 52 weeks (Human Resources and Skills Development Canada, 2006). As such, although the parental benefit level remains fairly consistent across the country over time, the maximum job-protected parental leave length does vary from province to province over time (ten Cate, 2003, pp.7).

Finally, I look at policies related to child care at the federal and provincial levels. Federally, the only component of child care policy that the government directly facilitates relates to child care costs. The Universal Child Care Benefit (UCCB) is a direct cash transfer in the amount of $100 per month per child under six. Since 2001, the federal government has given transfers to the provincial governments through the Early Childhood Development Initiative and the Multilateral Framework on Early Learning and Child Care. These transfers specify that funding must be used on provincially regulated child care and early learning programs for children under the age of six. As such, the federal government has an indirect impact on child care quality by encouraging the funding of regulated child care (Cool, 2004, pp.1). International rankings of child care programs, however, have found that the federal government's lack of direction may be to the detriment of child care accessibility, quality, and cost. In a 2008 evaluation of 25 OECD countries' performance in the child care sphere, Canada tied for last place with Ireland (Adamson, 2008, pp.2).

With no national directive on child care, the provinces take the bulk of the responsibility, and there is wide variation in their policies (Collier, 2007, pp.5). Table 4 summarizes coverage rates, proportion of child care spaces that are regulated and median monthly parental fees for child care from across the country. Quebec, once again, has taken a comprehensive approach to enhancing child care quality and accessibility while greatly decreasing child care cost. Its $5 a day program has put a cap on the amount that all parents have to pay for childcare, while its coverage rates are by far the highest in Canada. Additionally 87 percent of its regulated childcare is not-for-profit, which numerous studies have found are higher quality than for-profit child care facilities (Friendly, 2009).

Manitoba has the second lowest fees in Canada and is the only other province to legislate a maximum monthly fee for child care for funded child care centers. Manitoba and Saskatchewan have the highest proportion of regulated child care centers that are not-for-profit, at 94 percent and 100 percent respectively. Saskatchewan, however, also has the lowest coverage rate of regulated child care spaces, at 5.4 percent. The remaining provinces vary substantially, with the Maritime Provinces faring the worst. Their median monthly fees range from $467 per month in New Brunswick to $716 per month in Nova Scotia. They also have the lowest proportion of regulated spots that are not-for-profit. Alberta stands out as a "have" province with extremely low coverage rates for regulated spots, with just 12.2 percent of children zero to 12 having a regulated child care spot available to them. In provinces, such as Alberta, Saskatchewan, and Manitoba, with low coverage rates, the proportion of children cared for in informal arrangements, by both relatives and non-relatives, is the highest (Bushnik, 2005, pp.9).

Overall, the family policy context is varied, but some patterns do emerge. Quebec, in all instances, has surfaced as a leader in family policies – both financial and non-financial – going above and beyond any existent federally legislated requirements. Meanwhile, in the Prairies, Manitoba appears to have the most child-friendly policy environment and Alberta the least. Ontario and British Columbia are middle of the road, despite being much wealthier than most other provinces. Finally, the Maritime Provinces, likely due to their lack of financial resources, generally have less family-friendly environments, with Newfoundland performing the best likely due to its more plentiful resources. Even these provinces, however, still perform better in some cases than Alberta, the province with the highest GDP per capita in the country.

3. Previous Research and Theoretical Considerations

3.1. Previous research

3.1.1. Overview of Previous Research

There has been a substantial amount of research on the impact of family policy on fertility. Previous literature reviews by Sleebos (2003), Gauthier (2007), and Lattimore (2008), in addition to articles collected using JSTOR, internet search engines, and the reference sections of various articles, brought to light over 50 such articles. Only 26 of these articles were selected for

further analysis for my paper. These were articles that most closely fit with the research question, were frequently cited in other texts as foundational studies in the area, or provided background for the family policy context in Canada. Table 5 summarizes the countries, years of study, methods, data, dependent variables, and key policy variables for each of the selected studies in this literature review.

Previous research on the impact of family policy on fertility changes has largely revolved around the impact of policies that diminish direct costs of child bearing and child rearing, such as cash transfers, tax breaks, parental leave benefits, and policies aimed at reducing child care costs. Direct cost-reducing policies provide the easiest measurement proxies, as there is often a monetary variable that can be calculated. Previous quantitative research on the impact of indirect cost-reducing family policies, such as maternity or parental leave and child care access are less widespread, especially in Canada, where child care data is scarce and parental leave policies quite diverse.

Previous research has largely been focused in Europe, but also includes North America and Asia. Countries analyzed in this literature review include Austria, Canada, Finland, France, Germany, Italy, Japan, the Nordic countries as a group, Norway, various combinations of OECD countries, Spain, Sweden, Switzerland, and the United States. I focused on the studies on more recent findings from 2000 onwards, as these were predominantly the studies with the best data available and the most conclusive findings. However, I also included one pioneering study from the 1980's, Ekert (1986), and seven studies from the 1990's, four of which were foundational studies in the use of macro data in the analysis of family policy's impact of fertility.

The methods used in these studies included qualitative analyses, such as Gupta (2006), applications of economic models, such as Yasuoko (2008), and econometric analyses. In this paper, I focus mostly on studies that employed econometric methods to explore the linkage between fertility and family policy. Whether each study used macro-data or micro-data is another important methodological distinction. As aggregate data will be used in my analysis, I have included 12 studies that used aggregate macro-level data. Aggregate data was especially common in the cross-country analyses and regional comparisons within countries. The

remaining 13 studies employed micro-data from labour market surveys, national registers, and various other social surveys.

3.1.2. Parental Leave Policies Findings

Table 6 summarizes the results of each of the 26 articles, indicating whether the policy variables in question had a positive and significant, very small positive and not significant, or no significant impact on fertility rates. Some studies also looked at the impact on the female labour force supply, and the results for this variable are also included.

The studies looking at the impact of parental leave on fertility have somewhat uncertain results. Three of these studies, Lalive (2005), d'Addio (2005), and Averett (2001), found a positive significant impact on fertility while four found a positive non-significant impact, and three found no significant impact. Lalive (2005) used micro-data to determine that the probability of having a child within the three-year period following changes in parental leave policy was 4.9 percent higher than before the changes. The authors interpret their results as an indication that the timing and number of children were both impacted by these policy changes. Meanwhile, d'Addio used aggregate data and cross-country variations to show the positive significant impact of longer parental leave length of TFR. Averett used micro-data and found that the presence of maternity leave among young working women in the United States increased the probability of a second or higher order birth.

The four studies that had less significant results included Ronsen (1999), Duvander (2005), Winegarden (1995), and the qualitative study of Gupta (2006). Ronsen (1999) looked at Finland and Norway, finding that the impact was positive, but very small. The impact of parental leave on fertility was slightly larger in Finland. Meanwhile, Duvander (2005) also found mixed results, with a positive significant impact on shorter and medium paternity leaves on fertility in Sweden, but no such impact of longer term paternity leaves. Winegarden (1995) found no significant impact of paid maternity leave on general fertility rates, but did conclude that the positive impacts on reducing infant mortality rates and increasing female labour force participation rates without decreasing fertility. Finally, the study with no significant results was the cross-country macro comparison by Gauthier (1997).

3.1.3. Child Care Policies Findings

Three of the 26 studies found positive and significant effects of child care policies on fertility, while six found a positive but not significant impact on fertility, and two found no significant impact of child care on fertility. All three of the studies that found a positive significant impact of child care were based on aggregate data – two cross country comparisons in the OECD nations, Castles (2003) and d'Addio (2005), and one inter-canton comparison in Switzerland, Bonoli (2008). In each case, the authors were quick to note that the use of aggregate data could not control for a number of cross-country variations in many variables. Del Boca (2007) looked at the impact of child care cost on female labour force participation and use of child care in Italy, finding that lowering access costs to child care had a positive and significant impact on each variable.

The five studies that found positive but not significant impacts of child care on fertility were the qualitative and theory-based articles, in addition to Kravdal (1996) and Gauthier (1997). While Kravdal (1996) found significant impacts of child care on third birth rates in one regression, he also found that controlling for female labour force participation made this effect insignificant. Gauthier (1997), meanwhile, does not specifically measure for the impact of child care, but concludes that the higher impact of family benefits in the Nordic countries is related to in-kind benefits, like subsidized child care.

3.1.4. Benefits/Cash Incentives/Tax Break Policies Findings

The third category of policies explored in these papers was policies involving financial benefits, either through tax benefits or direct cash transfers. Of the 26 articles, 11 studies explored the impact of financial benefits on fertility. Five of these studies found positive and significant results while six found positive but an extremely small or not significant impact on fertility. Ekert (1986) was a foundational study that examined the impact of family benefits on fertility in France in the 1970's. Ekert found a small but significant impact of increased family benefits on the total fertility rate. A Canadian study, Zhang (1994) found similar results looking at a number of financial benefits, including tax exemptions, tax credits, family allowances, and maternity benefits from 1921 to 1983 using Ordinary Least Squares (OLS) regression similar to Ekert. Likewise, Bonoli used micro-data with OLS to the same effect. Two other Canadian studies that

used more complicated methods, such as Duclos (2001) using linear probability models and Milligan (2001) using a multinomial logit model, also had similar results when looking at Quebec's unique baby bonus policies in the 1980's and 1990's.

Six studies that explored the impact of financial incentives on fertility had weak positive findings. Hoem (1993) found that the "Speed Premium" in Sweden did impact the TFR, but largely impacted the timing of children after the first child rather than the total number. Further, Ekert (2002) found a positive impact of transfers on fertility in France when compared to Britain, which provided less generous financial benefits. The positive results found in the remaining studies were small. For instance, Hyatt (1991) found that fertility would increase by 0.09 to 0.26 percent for every one percent increase in Unemployment Insurance maternity benefits in Canada. The two micro-data studies by Hoem (2001) and Phipps (2000) found no significant impact of leave benefits on fertility. Phipps (2000) was a Canadian study that interpreted the lack of fertility response and labour market response of women to enhanced maternity leave benefits as lack of policy awareness by potential beneficiaries. Hoem (2001) found only tempo impacts of a change in parental leave policy in Austria in the 1990's.

3.1.5. Summary Comments

One noteworthy observation that applies to a number of the studies looking at cross-national comparisons, and is also relevant for my cross-provincial comparison, was made by Brewster (2000, pp.285). In his own review of the literature pertaining to family policy and fertility, he noted that the ability to capture the finer points of family policies, for instance detailed conditions surrounding leave policies, detracts from many policy analysis studies. Further to this, the inability to capture a broader social context can also create misleading results in these studies (Brewster, 2000, pp.286).

In her first review of the literature, Gauthier (2001) also makes a relevant observation that many demographic responses to family policies have tended to be short-term and, to a large extent, mainly impacting the timing of fertility rather than on the completed cohort fertility (Gauthier, 2001, pp.8). Bongaarts (2008, pp.49), however, demonstrates that policies that decrease the mean age at childbearing by 0.1 year per year could increase period TFR by as much as 20 percent. As such, even if the primary impact of family policy is on the timing of fertility, this

does not necessarily mean that family policy is ineffective. He concludes that policies impacting the tempo of fertility could actually be a very powerful and simple way to increase period fertility rates.

Overall, the implications of previous research for my study are not so straightforward. The ability to measure the impact of various family policies on fertility is shown to be difficult by these studies, especially due to the difficulty of finding appropriate proxies for many of the economic, sociological, and political factors that must be measured. Furthermore, the focus on direct cost-reducing policies, especially in the Canadian literature, is an indication that indirect-cost reducing policies have been more difficult to measure. This gap in the Canadian literature, however, provides further motivation for my study.

3.2. Theoretical considerations

There are a number of theoretical frameworks for analyzing fertility decisions, which include economic, sociological, and institutional frameworks. One common thread among these frameworks is their inability to consistently explain empirical variations in fertility patterns from the 1960's to present time (Brewster, 2000, pp.290). In the following section, I briefly analyze fertility patterns using traditional economic and sociological perspectives. I then demonstrate that the inclusion of institutional factors, such as family policy environment, in economic and sociological fertility theories is necessary to explain fertility trends since the 1990's at the aggregate level. From this analysis, I determine the most appropriate theoretical model for my analysis.

3.2.1. Economic Theory

Since the 1960's, economic theory explaining fertility behaviour has largely revolved around Becker's (1960) New Home Economics model. Simply put, this demand model assumes the people have varying tastes for goods and services, and children are considered one such good. Given people's time and income constraints, people will maximize their individual utility functions by allocating their time and money to the goods that maximize utility. If the cost of a good, in this context represented by the costs of childbearing and childrearing, increases, then people will demand less of the good. The New Home Economics model also factors in the trade-off between the quantity of children and their quality. The model assumes that the income effect

on the demand for child quality is of a larger positive magnitude than the income impact on demand for child quantity (Schultz, 2001, pp.5580).

In empirical research to date, the New Home Economics model has been applied on the basis of a traditional gender relationship (Gauthier, 1997, pp.296). As such, income increases, measured by family and male income, are predicted to positively impact the demand for a child. Conversely, poor economic horizons, represented by such factors as unemployment, can act as deterrents to child bearing. Meanwhile, price factors, with include increases in the opportunity cost of child bearing and child rearing, such as higher female income, education, and labour force participation, would decrease the demand for a child. Butz and Ward (1979, pp.318) demonstrate the importance of distinguishing between households with employed wives and those without, especially from the 1960's onwards. The results of their study show that the distinction between male income and female wages to measure income versus price effects on child bearing was important in any empirical model assessing the impact of economic factors on fertility.[8]

Becker's economic theory has and continues to be foundational theory in a number of empirical studies evaluating the impact of various economic and political factors on fertility, including the majority of the studies in my Previous Research section.[9] It has not, however, gone without criticism. Gauthier (2001) points out that the neoclassical underpinnings of this model are that individuals have full information of costs and benefits of various alternatives and that the decision to have a child is the result of an economically rational decision. Numerous scholars have been critical of these ideas (Gauthier, 2001, pp.4). Though a valid point, this criticism does not necessarily mean that the model will not predict correctly. However, other scholars who have criticized the lack of sociological determinants in the model have pinpointed a factor that can impact the ability of the model to predict correctly: changing tastes. Through a number of qualitative observations, Cleland and Wilson (1987) demonstrate that sociological factors, namely ideational change, are key determinants of fertility.

[8] Butz and Ward tested the hypothesis that countercyclical fertility, that is fertility increases in poor economic times, could be attributed to lower female wages and vice versa.
[9] These studies include Apps (2004), Ekert (1986), Ekert (2002), Gauthier (1997), Gauthier (2007), Milligan (2001), Yasuoko (2008), and Zhang (1996).

Recent empirical trends have also plagued the Becker model. The Becker model had been relatively successful in explaining the earlier described Fertility Transition of the 1960's until the 1990's. Over this time span, female labour force participation and female education rates increased throughout much of the developed world, thereby increasing the opportunity cost for childrearing. As Becker's theory would predict, fertility rates dropped dramatically over this time period. However, empirical evidence has not supported this theory since the 1990's, when a reversal in the price effects with respect to women's earnings and fertility emerged. Since the 1990's, a positive correlation was shown to exist between women's earnings and labour force participation and total fertility in Europe at the aggregate level (Kohler, 2006, pp.15). As seen in Figure 6, Canada has been no exception to the positive correlation between female labour force participation and fertility rates since the 1990's. Given this reversal, I look to other offsetting variables within the theory to explain Canadian fertility rates from the 1990's onwards.

3.2.2. The Modified Economic Approach

Easterlin (1987) attempts to address the exclusion of sociological factors in economic fertility theory. Easterlin's model takes into consideration family income levels relative to socially-produced expectations or aspirations (Pampel, 1993, pp.496). In this model, relative income is defined as the ratio of the relative magnitude of one's "earnings potential" and one's "material aspirations" (Abeysinghe, 1991, pp.53). Income potential is dependent on current income and perceived future earning power, which in turn depends on competition for jobs, opportunities for promotion, and the tightness of the labour market. Easterlin hypothesized that weaker economic prospects of a cohort with respect to those of its parents would induce demographic adjustments (Macunovich, 2000, pp.236). Extending this idea to fertility, it follows that the higher the income potential, the higher the fertility (Pampel, 1993, pp.496).

According to Easterlin's theory, cohort size is the key determinant of both income potential and the expected standard of living. Specifically, larger cohorts face crowding out in the labour market due to more workers, stronger competition for jobs, fewer opportunities for promotion, and lower real wages. Comparative size of a current cohort to that of a previous cohort, therefore, should provide a measure of income potential relative to the income of the parental generation, or the expected standard of living (Pampel, 1993, pp.497). Typically, relative cohort size has been defined as the ratio of the number of persons aged 30 to 64 to the number of

persons aged 15 to 29. Easterlin calculated relative cohort size with the male population only (Abeysinghe, 1991, pp.54).

One noteworthy point in comparing the Becker and Easterlin models is that they do not contradict each other with respect to their predictions. They do, however, cite different mechanisms as driving forces behind certain factors. Most notably, female labour force participation is driven, according to the Becker model, by increases in female wages. Increased wages increase the opportunity cost of non-participation for women who are not working. Meanwhile, in the Easterlin model, higher female labour force participation rates are driven by economic pressures. According to this model, if family economic aspirations are not being met by a male earner alone, then there is incentive for the female partner to enter the workforce (Oppenheimer, 1976, pp.436).

Empirically applied, relative cohort size has been found to be a successful predictor of Canadian fertility from the post-World War II period until the 1970's (Abeysinghe, 1991, pp.53). From this period onwards in Canada, and even prior to this in Europe, the relative cohort size theory has been found to be less successful when tested empirically. Oppenheimer (1976) argues that a potential reason for this failure is the exclusion of female economic contributions to the family. She argues that the growing financial contribution of women to household income has increasingly acted as a buffer to lower male income during hard economic times. Another important consideration is explored by Pampel (1993, pp.511). Pampel found that the integration of institutional factors, such as the degree to which a government ensures social protection and high rates of female labour force participation, act as cushions against the impacts of large cohort size on economic well-being.

Overall, the Easterlin model is more comprehensive than the pure economic model of Becker due to its inclusion of sociological factors. However, given its exclusion of institutional considerations, the model still shares shortcomings with the Becker model when tested empirically with fertility data from the 1990's onwards. As noted by Esping-Andersen (2007, pp.20), when theory and empirics are at odds, alternative explanations must be sought.

3.2.3. Institutional Considerations

Brewster and Rindfuss (2000, pp.279) seek to overcome the discrepancy between theory and empirical evidence by focusing on the role of institutional factors in easing the worker-mother conflict. They note that in countries where women have not been able to successfully combine childrearing with work, or where there are high degrees of role incompatibility, fertility has declined substantially. From this, they conclude that theory attempting to explain the fertility-employment relationship must take into account social, economic, and institutional (i.e. policy) contexts (Brewster, 2000, pp.292).

Gauthier (2001) integrates institutional factors into economic theory by explaining that any reduction in the cost of children (as a result of public subsidy) or any increase in income (as a result of transfer payment) is expected to increase the demand for children (Gauthier, 2001, pp.4). The same notion can be extended to in-kind benefits that diminish role incompatibility, such as easier access to and cheaper provision of child care and job-protected parental leave policies that ease the transition into and out of the labour force. Kohler (2006, pp.41) expands on this notion by suggesting that institutional settings characterized by "labour market rigidities, insufficient child-care support and a prevalence of relatively traditional gender roles, favour an overall low quantum of fertility."

Applying this theory to the Canadian context, I conclude that provinces that implement family policies diminishing role incompatibility over time will have the most success in stemming fertility declines. Table 7 summarizes the predicted relationships between fertility and the variables discussed above according to the Becker and Easterlin models.

3.3. Hypotheses

Table 7 outlines the predicted relationships between fertility and variables impacting demand for children (i.e. income and opportunity costs), institutional factors, and sociological factors. Based on these predicted relationships, I can hypothesize whether and how provincial job-protected parental leave policies have impacted fertility rates from the 1970's to present day.

According to the New Home Economics model, I would expect that an increase in male or family income and enhanced economic prospects (i.e. lower unemployment) would be positively

associated with fertility. However, female earnings and labour force participation would be negatively correlated with fertility, as traditional economic theory links these indicators to higher opportunity costs of child bearing (Gauthier, 1997, pp.296). The higher the opportunity costs of child bearing and child rearing, all other factors remaining equal, the less likely a woman is to have a child. Additionally, the Easterlin relative cohort size hypothesis would predict that as the relative cohort size decreases (i.e. the current cohort size increases in relation to the previous cohort), fertility will decline, due to the diminished relative economic prospects of the current cohort.

Institutional factors that decrease barriers to balancing work and family life, in this case longer job-protected parental leave, are expected to decrease the opportunity cost of child bearing. While these lowered opportunity costs can positively impact fertility rates, I note that job-protected leave is more of a proxy for the general indirect cost-reducing policy framework in each province. More generous policies are predicted to positively impact fertility.[10] Even so, however, it should also be mentioned that the predicted relationship between parental leave length and fertility is not necessarily positive. While job protected leaves enable flexibility into and out of the job market for new parents, it also means that parents who take longer parental leaves may lose out on human capital gains while removed from the labour force. Additionally, since to a large extent, this is an unpaid leave, there are opportunity costs to taking an extended leave in some provinces (Averett, 2001, pp.406). As such, the predicted relationship between fertility and unpaid job-protected parental leave is uncertain.

Another noteworthy point is the target population of this policy. While the largest portion of job-protected leave can be taken by either parent, traditionally the uptake for parental leave has been much lower for men than for women in Canada (OECD, 2006, pp.7). It has been argued that because female income tends to be lower than male income on average, there is greater incentive for women to take unpaid or partially-compensated leaves with upper limits. Furthermore, access to job-protected parental leave is limited to those who pay into employment insurance and have had some form of continuous employment in the months preceding the leave.

[10]It is not argued that this policy alone is very likely to influence fertility rates, but that it is an important and valid measure of how family friendly the policy environment is in each province, and will be treated as an indicator of this. This is explored further in the discussion section of this paper.

As such, parental leave policies tend to be targeted towards parents with relatively stable employment. In an analysis of eligibility for employment insurance among new mothers in Canada, Phipps (2000, pp.420) finds that new mothers with less than a high school diploma are much less likely to be eligible for maternity unemployment insurance than new mothers in any other educational group.

4. Model, Data, and Methods

To test my hypotheses, I will conduct panel data regressions on aggregate-level data maintained by Statistics Canada. As my theoretical model indicates, the variables that should be included in my statistical analysis include a measurement of fertility and factors impacting demand for children, such as family income, female earnings, unemployment, and female labour force participation. Institutional considerations measuring the ease with which a parent can transition back into the workforce following child bearing should also be factored into my analysis. Finally, a variable measuring the relative cohort aspirations should be included. Given available data, it is possible to isolate some of these variables for inclusion in my model. There are, however, limitations regarding how targeted this analysis can be and how accurately the available data will measure the exact variables outlined in my theory. As such, most of the variables in my empirical model will be proxies for the theoretical variables.

4.1. Model Specification

My empirical model will use TFR, the dependent variable, as a measurement of fertility (*tfr*). Independent variables are as follows. For demand factors, male income in 2006 Canadian dollars (*m_income*) will measure family income, female earnings in 2006 Canadian dollars (*f_earnings*) will measure the opportunity cost of child bearing and rearing for women, female labour force participation (*flfp*) will measure the relative position of women in the labour force and in society, and unemployment (*unemp*) will measure general economic conditions in each province. Institutional considerations will be measured by the maximum months of unpaid job-protected parental leave (*pl*) available to a mother in each province, while relative aspirations will be measured by the relative cohort size (*rcs*) of 30 to 64 year old men to 15 to 29 year old men. Each of the dependent variables will be lagged by one year. The TFR will be logged so that the percentage change per unit increase in each independent variable can be calculated.

The model is written as follows:

$$\ln TFR_{t} = \alpha_i + \delta_t + \beta_1 m\_income_{it-1} + \beta_2 f\_earnings_{it-1} + \beta_3 flfp_{t-1} + \beta_5 unemp_{it-1} + \beta_6 pl_{it-1} + \beta_7 rcs_{it-1} + u_{it}$$

In this model, α_i represents the unobserved provincial fixed effects and δ_t represents the time effects that are common in all the provinces at any given time but vary over time. The error terms, u_{it}, are zero mean random variables that vary across the provinces over time. The error term is assumed to capture the province-specific effects that are fixed over time and the remainder of the disturbance (Breau, 2007, pp.11). The model assumes away any reverse causation or endogeneity of the independent variables. A limitation of this specification is explored further in the Discussion section of this paper.

4.2. Data Sources and Sample

Table 8 outlines the data sources for the proposed theoretical model. Most variables were obtained from Statistics Canada's Canadian Socio-Economic Information Management System (CANSIM) database. This database contains a number of aggregate Canadian socioeconomic statistics. However, in some cases, CANSIM did not contain data for the whole period 1976 to 2006. As such, various Statistics Canada publications were used to piece together the missing data.

The TFR data was obtained from CANSIM, Statistics Canada *Births and Deaths* publications and a Statistics Canada *Health Reports* publication by Ford and Nault. It should be noted that TFR information for Newfoundland was not available prior to 1990.[11] Unpaid job-protected parental leave data from 2000 onwards was obtained from the Human Resources and Skills Development Canada (HRSDC) website, provided in Table 8. Data for the period 1976 to 2000 was found in a study by Cate (2003). The data for the remaining independent variables was obtained from various tables in CANSIM, outlined in Table 8.[12]

[11]The *Births and Deaths* series of publications, catalogue number 84F0210XPB, were used for various years after 1994, the Ford and Nault publication for years prior to 1994, and CANSIM for 2000 onwards.
[12] The sources for the CANSIM average total male and female income variables and the female labour force participation rates by province were obtained from tables in the Canadian Labour Force Survey. Data for relative cohort size was found in CANSIM, using census figures.

Table 8 also outlines the sample size for each of the variables. Data for all the variables, with the exception of TFR, could be obtained with consistent measurement from the period 1976 to 2006 for all ten provinces, totaling 31 years of observations. As TFR data could not be obtained for Newfoundland prior to 1990, this limits the number of observations to 286.

4.3. Method

I use panel data to test my hypothesis. Panel data allows me to capture both the dynamic (time series) and static (cross section) aspects of the determinants of fertility (Ogwang, 2006, pp.2). Additionally, the increased number of observations for each variable in the sample decreases the likelihood of multicollinearity between explanatory variables. As 15 years of TFR observations are missing for one province, Newfoundland, the panel is unbalanced. I use two different types of models and compare the results of these regressions. I use a pooled OLS regression and then compare the results of this regression with a fixed-effects regression.

In the first model I use a pooled OLS model with dummies for each year. The pooled OLS approach is useful in providing a base comparator for the results of the fixed effects regression. Panel data analysis using pooled OLS assumes that observations have the same constants. It can be applied in instances where there are no significant provincial effects. In this study, I have hypothesized that changes over time and variations within provinces will have an effect on fertility rates. Province-specific differences in TFR are likely to breach the homoskedasticity assumption of OLS regressions and give rise to heterogeneity and biased OLS results (Breau, 2007, pp.82). To control for these specific effects, a two-way fixed-effects or random-effects model can be used.

Fixed effects and random effects models are alternatives to addressing the assumption of constant intercepts. Each province has its own unique socioeconomic and political conditions that can impact fertility. A fixed effects model assumes constant slopes, but different intercepts for each province. The constant in a two-way fixed effects model will control for factors that vary across provinces, but are invariant within provinces, as well as for time effects that are common in all provinces at any given time but vary over time. Unobserved, province-specific effects are assumed to be fixed and correlated with the explanatory variables. Meanwhile, a random-effects model assumes that part of the unobserved province-specific effects are random

and uncorrelated with the explanatory variables (Breau, 2007, pp.83). A Hausman test with my data reveals that the test's null hypothesis of a significant difference between fixed-effects and random-effects regression results can be rejected. As such a fixed-effects model is chosen for my second regression.

It is noteworthy to mention the result of a test for heteroskedasticity in my data and how I have dealt with this problem. Using a likelihood ratio test for heteroskedasticity in panel data, it is evident that heteroskedasticity is of issue. To ensure that the standard errors are robust to heteroskedasticity, the robust post-regression command is used.

Another important issue that comes to light from an overview of the variables is the potential for endogeneity. It would appear, especially in the case of my policy variable, that at certain times spikes in TFR precede increases in unpaid job-protected leave while at other times the opposite is true.[13] It is quite feasible that there are effects on the policy variable from, for instance, new parents in preceding time periods demanding a more child-friendly policy environment. This is something that should be noted prior to any interpretation of my results.

A Hadri Lagrange Multiplier test was also conducted for non-stationarity, and it was apparent through the rejection of the null hypothesis of stationarity that non-stationarity was present in my data. I considered and attempted some techniques to correct for non-stationarity, so that I could ensure spurious inferences about the relationship between my variables were not made. In the end, I continued the analysis without corrections for these factors, and I factored the risk of spurious regression into my analysis. A further discussion of endogeneity and non-stationarity issues is included in the Discussion section of this paper.

4.4. Variable Discussion

It has been noted that the data being used pose a number of problems, including endogeneity and non-stationarity. Given these shortcomings, it is important to perform detailed univariate and bivariate analyses on each of the variables prior to the multivariate analysis. Univariate analysis provides a general understanding of the context in which fertility changes occurred in each of the provinces. The bivariate analysis will look at the degree to which TFR is correlated with each of the variables in question. In the following section, I will discuss the rationale for

[13] These concerns become especially apparent in the following section of this paper, Variable Discussion.

the choice of variables for the empirical model and outline the trends for each of the variables in question. Contextual explanations for why independent variables changed as they did are included in this discussion. Finally, I look at how each variable's trends move in relation to TFR trends. Table 9 outlines the observations, means, standard deviations, and minimum and maximum values for the Prairies Provinces, Central Canada and British Columbia, and the Maritimes respectively.

4.4.1. Dependent Variable

The dependent variable will be TFR, which will indicate the level of demand for children. TFR measures the total number of children that a woman will have in her lifetime given that she survives until her fiftieth birthday by summing the age-specific fertility rates (ASTFR) for a woman, usually aged 15 to 49 (Hinde, 2007, 100).[14] Figures 3, 4, and 5 show provincial TFR patterns from 1976 onwards, and these patterns were described in more detail province by province in the Background section of this paper.

A general downward trend from 1976 onwards is apparent in all the provinces. There are, however, three interruptions to this downward trend. Firstly, from around 1982 to 1984 in the Prairies and Central Canada and British Columbia there is a slight leveling off and reversal of fertility declines. Two more prominent reversals in fertility decline are apparent from 1988 to 1992 and from 2001 onwards. In the Prairie Provinces and, especially, Central Canada and British Columbia, the spike in fertility rates from 1988 is very apparent. This spike occurred more mutedly in the Maritime Provinces. From 2001 onwards, all provinces have exhibited a fertility rebound, but this rebound is most prominent in the Prairies and Central Canada and British Columbia, and to a lesser extent in the Maritimes.

[14] TFR is not without drawbacks when used as a predictor for future population growth. As Sobotka (2004, 213) demonstrates, the tempo-adjusted indicator of TFR (cohort total fertility rates) may be a more accurate measure of current fertility, as it takes into account delays in childbearing that many countries are undergoing .

4.4.2. Independent Variables

Male Income and Unemployment

To measure the opportunity cost of child bearing and child rearing, I have assumed a traditional household gender role, as per New Home Economics assumptions. In such a case, male total income, as measured by earnings, in addition to investments and government transfers, is an appropriate measure for family income. In this study, male income is measured in 2006 Canadian dollars. Unemployment is provided as a general indicator of the economic outlook. During times of economic uncertainty, postponement becomes a huge factor in fertility decisions. People are more inclined to invest in education to improve their job prospects and wait until the economy is more stable before childbearing. The absolute correlation between male income and unemployment is very high (71 percent). Dramatic declines in male income and increases in unemployment can be found around 1982 and 1990 across the country. These trends are shaped by the same general conditions in the economy. As such, I will examine the forces driving both of these factors together.

Figures 7, 8, and 9 and 10, 11, and 12 respectively outline the trends in each of the provincial groupings for male income and unemployment in relation to TFR. For the time period in question, male earnings and unemployment are turbulent, but experience some distinct spikes and troughs. Around 1979 to 1980 there is an apparent spike in male income and decrease in unemployment, especially noticeable in the Prairie Provinces. In 1979, the oil-shocks that wreaked havoc on so many Western economies had a lesser impact on the resource-heavy Canadian economy. The economies of the oil-rich Prairie Provinces, in fact, were strengthened. As a result, the financial hubs of Canada in Central Canada and British Columbia also experienced a spike in male wages and trough in unemployment at this time. The Maritimes, meanwhile, did not experience these extremes, with the exception of Newfoundland – another province with oil reserves.

Male income levels dropped and unemployment increased significantly in 1982, as persistent inflation and high interest rates pushed the country into a major recession (Human Resources and Skills Development Canada, 2006). Although a slight recovery followed in 1983, male income and unemployment remained at these extreme levels from the mid to late 1980's until the

mid-1990's. This can largely be attributed to large scale structural changes that occurred in Canada around this time. Nineteen-eighty-seven saw the introduction of the North American Free Trade Agreement (NAFTA) which introduced freer movement of American imports and companies. Newer technologies, widespread deregulation, and the introduction of a national sales tax also impacted the economy tremendously at this time (Kwan, 2002, pp.1). Kwan (2002, pp.6) found that the adaptation of new technologies required for Canadian firms to compete in this new environment implied that more money was spent on investments in new technologies and less on wages. Workforce composition changes occurred throughout this period, as companies increasingly required more adaptable employees. Further to these changes, any gains made in this period were stymied by the American recession of the early 1990's which severely impacted Canada, and explains the extreme drop in male income and spike in unemployment around this time.

From the mid-1990's, however, the Canadian economy was able to adapt to this restructuring process and recover. Male income increases and unemployment decreases from the mid-1990's until at least 2000 in both the Prairies and Central Canada and British Columbia. The Prairie Provinces have seen steady economic growth from the late 1990's, as oil prices have increased steadily. Central Canada and British Columbia, on the other hand, whose financial sectors are closely tied to the United States, have seen some stagnation in economic growth from 2001 onwards. The Maritimes, meanwhile, did not see any economic rebound from the mid-1990's onwards, and have continued to struggle due to the generally weaker performance of their main industries – fishing, shipbuilding, and logging – in the 1980's and 1990's. Although unemployment rates have declined since the mid-1990's relative to the other regions, Maritime unemployment has remained high. Only Newfoundland, with recent discoveries of oil deposits in the 2000's, has fared well.

Male income seems to be a fairly good predictor of TFR from 1976 to 2006 across Canada in terms of the general movement, but falls short of predicting some of the more obvious peaks and valleys in TFR trends. When lagged, male income becomes increasingly correlated with TFR, exhibiting the highest correlation, 30.4 percent, when lagged four years. Unemployment proves to be much more in tandem with TFR throughout the period. Whereas the extreme dip then spike in TFR across the country in the late 1980's is difficult to attribute to a change in male

income, it does very obviously follow an extreme rise and fall in unemployment levels. In fact, applying a lag of one to two years across all the provinces, one can see a very apparent negative correlation between TFR and unemployment. The highest absolute correlation is apparent with a two year lag, at 57.2 percent. Furthermore, this correlation remains above 50 percent even after the anomalous 1989 spike in TFR.

Female Labour Market Earnings

Female income must be considered in a different light than male income. Opportunity cost is best reflected by foregone earnings from participation in the labour force. As such, female income should not include government transfers and investment gains, as the measure for male income does. The female income variable is, therefore, female labour market earnings in constant 2006 dollars. For female earnings, there is also an age consideration. As child bearing is limited to women within a certain age group, it is preferable to limit analysis to the average female earnings of women within this age group. The majority of births take place in the 20 to 34 age range, and it would be ideal to focus analysis on female earnings within this age range. My data source, however, only provides this data for the 25 to 34 age range. As such, female earnings for the 25 to 34 age range are used.

Figures 13, 14, and 15 outline the trends in female earnings and TFR from 1976 to 2006 for the three regions. Female earnings steadily increase across the country, but as with other variables it is to varying degrees in each region. In the Prairie Provinces, the first decade in question shows a type of rollercoaster pattern that generally moves upwards, but stagnates somewhat from the mid-1990's to mid-1980's. This stagnation is likely tied to the economic structural changes occurring in this period, as discussed above. Marked improvements in female earnings levels occur from the mid-1990's onwards. Although females in the Prairies started out in 1976 with wage levels that were on average $3,000 lower than those in Central Canada and British Columbia, by 2006, this difference was driven down to around $1,000. The upward trend in female wages is far steeper and more consistent in Central Canada and British Columbia, with noticeable dips both in 1982 and 1991, when the aforementioned recessions took place in Canada. A similar picture is painted in the Maritimes, but with the noteworthy distinction that

the absolute levels of income are much lower than in the other two regions, and the gains far more gradual.

Female income is a not a consistent predictor of TFR, if one does not take into consideration changes in the institutional context from the 1990's onwards. A general negative relationship is apparent in all provinces from 1976 until the 1990's. Around 2000, however, when the TFR reverses in all the Canadian provinces, the correlation with female earnings becomes positive. The reversal in correlation is due entirely to the spike in TFR after 2000. The previous spike in TFR experienced across the country around 1989 cannot be explained by any extreme changes in female earnings. One thing that is apparent is that the correlation between TFR and female earnings prior to 1989, 25.6 percent, is much greater than the correlation between these two variables following 1989, 6.3 percent. Indeed, the 1990's present an interesting departure from the rest of the years in question with regards to this relationship, as post-2000 observations appear to exhibit a much higher correlation between TFR and female earnings.

Female Labour Force Participation

Female labour force participation is an imperfect proxy for the position of women in a society, and the relative importance of women's career aspirations. In this case, the variable captures the rate of women both employed and unemployed who participate in the labour force as a rate of the total female population in that age range. I have taken the rate for women aged 25 to 44, as this was the age range available that best captured the labour force activity of women of child bearing age.

Figures 16, 17, and 18 outline the trends in female labour force participation rates and TFR from 1976 to 2006 for the three regions. Across all provinces, there is a consistent upward trend in this variable, with a slight leveling at or above 75 percent participation rates in all the provinces. Central Canada and British Columbia remain extremely consistent with the national average throughout the entire period while the Prairie Provinces surpass it around 1980 until converging again around 2000. The Maritimes have remained consistently lower than the national average until convergence around 2000.

Given the steady upward trend of this variable, and the turbulence of TFR over the same time period, it is difficult to attribute many of the spikes and valleys in TFR levels to female labour force participation alone. The overall correlation between the two variables is 27 percent. However, when I divide the period into pre and post-1990, the correlations become much larger, respectively 38 and 46 percent. It does appear that the leveling off of female labour force participation growth rates from 1990 onwards do correspond with the spike in TFR around 1989, but this leveling off appears to start after the large increase in TFR.

Job-Protected Leave

My variable to measure policies alleviating indirect child bearing and child rearing costs is unpaid job-protected parental leave. It is calculated by summing the maternity leave and parental leave, to the maximum allowable leave length for a parent. Job-protected parental leave is an imperfect proxy for indirect cost-reducing polices, and there are some assumptions underlying its use. Firstly, it is assumed that the mother takes the entire amount of time for the parental leave. In most provinces, both parents can take the parental leave period, with the stipulation that if a mother has taken the full maternity leave, her parental leave is limited to 35 weeks. However, in some provinces, such as Alberta, New Brunswick, and Prince Edward Island, the parental leave portion must be shared between both parents. In these cases, it is assumed that the mother took the entire leave.

Second, it is recognized that unpaid job-protected leave is only one component of parental leave policy. The benefits component, however, is controlled at the federal level, and only topped up by one province, Quebec. As such, provincial variation only comes into play in the leave length component of the policy. Further, parental leave benefits are viewed as a component of direct cost-reducing family policy, the analysis of which is not the aim of this paper. For this reason, the full unpaid length that is available to parents is used.

Figures 19, 20, and 21 outline the trends in job-protected leave and TFR from 1976 to 2006 for the three regions. Changes in unpaid job-protected leave occur in one direction only, but up until the major legislative changes of 2001, discussed in the Background section, they occurred at different times and to different degrees across the country. As discussed earlier, there were three changes to federal legislation from 1976 to 2006, and they occurred in 1984, 1999, and 2001

(Campbell, 2006, pp.181). However, not all provinces fell in line with this legislation immediately. Alberta provides a good example of this. All three Prairie Provinces demonstrate a fairly uniform pattern, starting at around 18 weeks of leave until the early 1990's for Saskatchewan and Manitoba. In 1993 and 1995 respectively, Manitoba and Saskatchewan increased their leave length to 30 and 34 weeks. Alberta, however, did not follow suit until the federal legislative changes of 2001, after which all three provinces increased to a minimum of 52 weeks.

Ontario, Quebec, and British Columbia exhibit two distinct patterns. Firstly, British Columbia and Ontario share a similar trend, starting at 18 and 17 weeks of leave respectively. Ontario increased its leave to 35 weeks in 1992, and, along with British Columbia, again in 2001 to the mandatory 52 weeks. Quebec exhibits a completely different pattern than all the other provinces, having adopted its own unique family allowance plan in 1967. It starts the period in question with the shortest parental leave length, zero weeks, but had caught up to the rest of Canada in 1979, with the adoption of maternity leave benefits. In 1991, Quebec surpassed the rest of Canada in terms of parental leave length, extending the leave to 52 weeks in the context of a drastic expansion of its family policy benefits. In 1997, Quebec switched to a more holistic approach to family policy, transferring funding to indirect cost-reducing policies in the form of child care accessibility and parental leave benefit enhancements. As of 1997, 70 weeks of parental leave are available to Quebec parents, and the compensated weeks are far higher than in the rest of Canada.

Finally, the Maritime Provinces' parental leave patterns from 1976 to 2006 are relatively consistent with each other. Prince Edward Island started the period at the lowest level, only adopting parental leave in 1981. By this point, all four provinces had a leave level of 17 weeks, which was extended between 1991 and 1994 by each of the provinces. New Brunswick extended the leave to the greatest extent, reaching 35 weeks, while Newfoundland extended the leave to 30 weeks. Following the 2001 legislative changes, all four provinces extended their leave length to 52 weeks.

Job-protected leave does not vary directly with TFR. Like female earnings, it moves consistently upwards, initially exhibiting a negative relationship with TFR until a reversal around 2001.

However, it does seem closely tied to the major spikes in TFR that occur around 1989 and 2000. These sharp rises in TFR across the country occur in most provinces around the time that parental leave lengths were increased. However, in certain instances, such as the early 1990's, increases in leave length were immediately preceded by a spike in TFR. It is also important to note that until 1988, there is a consistently positive correlation between unpaid job-protected parental leave and TFR. In the 1990's, however, this correlation becomes quite large and negative, until reversing and becoming small and positive in 1998. These patterns do bring to light the question of whether these policies are simply supplementary to TFR changes or even perhaps caused by them.

Relative Cohort Size

As discussed in the theory section, relative cohort size is used as a proxy for relative income. It is calculated by dividing the population aged 30 to 64 by the population aged 15 to 29. As the younger cohort increases relative to its preceding cohort (thus decreasing the relative cohort size) a crowding out effect is thought to take place, and fertility is supposed to decline. Relative cohort size exhibits a very consistent trend across the country over the time period in question. In all provinces, there is a steady ratio until around 1985, when there is a much more dramatic increase in RCS. This increase coincides with the post-World War II baby boom generation reaching the ages of 30 to 64, and explains the sudden increase in all the provinces.

Figures 22, 23, and 24 outline the trends in relative cohort size and TFR from 1976 to 2006. In the Prairie Provinces, the slow initial increase in the late 1970's and the leveling off that occur in the mid-1990's are much more pronounced than the national average. Additionally, the increase from the mid-1980's is less steep. The heavy resource base of the industries in these provinces may help explain this trend, as younger migrants from across the country are drawn to these economies for work. There are, consequently, higher populations in the 15 to 29 age range. While Central Canada and British Columbia follow the national average very closely, the Maritimes exhibit a similar pattern, but with slightly steeper inclines than the national average. Part of the explanation for this different pattern is that the Maritime Provinces are the source of many of the young migrants to the resource-heavy Prairie Provinces.

Across the country, the relationship between RCS and TFR seems inconsistent over this time period. The correlation between RCS and TFR starts out as negative and remains so until the mid-1980s. At this point, in all three regions, it becomes positive as the TFR spikes around 1989. Following this, there is an obvious negative correlation across all the regions.

4.4.3. Concluding Remarks

From the bivariate analysis, there were a number of findings that came to light. The smaller and more delayed impact of male income on TFR and the decreased correlation between female earnings and TFR in the 1990's seem to point to the importance of another key factor in explaining TFR trends throughout this period. Job-protected parental leave does not appear to be a likely candidate for this, as the correlation during the 1990's becomes negative for most of the decade. The unemployment rate, however, is a prime candidate for this missing link, as its correlation with TFR remains above 50 percent even after the irregular spike in TFR in 1989. It would appear, therefore, that although income and opportunity cost are important determinants of TFR, general economic outlook has a more immediate and pronounced impact on fertility rates at the aggregate level. It remains to be seen what the multivariate analysis will show with regards to each of these variables.

5. Results

5.1 Statistical results

The statistical results of my multivariate models are outlined in Table 10. Further to the coefficient and hypothesis test outputs, I have calculated the percentage change that a one unit increase in each independent variable will have on TFR. This was calculated using the following formula: 100*(exp(b)-1). These values are also included in Table 10.

5.2. Discussion

5.2.1. Comparison of the Models' Results

Looking at the pooled OLS results, the majority of the variables appear to be significant and with signs that are feasible according to the theoretical considerations. The notable exceptions to this are male income and female labour force participation, whose signs are the opposite of what

would be expected according to the outlined theory.[15] Female earnings are shown to be insignificant in the pooled OLS regression. The R-squared value for this model implies that these variables account for 81 percent of the variation in TFR. However, this number should be interpreted with caution, as R-squared values are typically inflated in time series regressions.

Meanwhile, once I control for inter-provincial differences and temporal variations in the independent variables with the fixed effects model, the results look quite different. The signs in the fixed effects model regressions are the same as the pooled OLS results, except for the female labour force participation, female earnings, and relative cohort size variables. Additionally, the number of independent variable coefficients that are significant is much smaller. Only female earnings are significant at the five percent level, while unpaid job-protected parental leave is significant at the ten percent level and female labour force participation almost significant at the ten percent level. The remaining coefficients are highly insignificant.

The R-squared values for the fixed effects model indicate that within each province, the variables I have chosen account for 72 percent of the TFR variation; however, when the TFR differentials between provinces are taken into account, these variables only account for around 11 percent of the variation. These differences in the R-squared values may indicate that there are important interprovincial differences that are not being accounted for by these variables. For instance, differences in culture and political ideology are key factors in explaining inter-provincial differences in TFR and have not been captured in this model.

Another important consideration in comparing the two models is outlining what significance in one of these models, but not the other, might mean. Generally speaking, if there are significant coefficients in the pooled OLS results that are insignificant in the fixed effects results, this could be an indication that changes in a given variable are not important in explaining changes in fertility *within* provinces over time. However, these variables are likely important explanatory factors behind TFR differences *between* provinces. On the other hand, significance in the fixed effects regression results but not the OLS regression results implies that changes in a given variable affecting fertility may be related to changing conditions within a province. This distinction will be useful in a more detailed discussion of the variable results below.

[15] While it was considered that multicollinearity was the cause of these unusual signs, dropping highly correlated variables did not change the signs of either of these variables.

5.2.2. Variable Results Discussion

Some of these results are highly unexpected, both with respect to my bivariate analysis and with respect to theory and previous literature. The insignificance of unemployment in the fixed effects model is especially counterintuitive. Although its impact on TFR was both significant and relatively substantial in the pooled OLS model, this was not the case when interprovincial variations and temporal changes were controlled for. Previous research has been nearly unanimous regarding the negative correlation between unemployment and fertility, and this correlation was apparent in the bivariate analysis. Male income exhibits the same significance in the OLS regression, but not the fixed effects regression. The negative relationship of male income and TFR is also unexpected according to theory, previous findings, and bivariate analysis with this data. Though initially thought to be due to multicollinearity, this does not appear to be the case, as the sign remains negative even when highly correlated independent variables are removed. As noted, significance in the OLS model but not the fixed effects model might be an indication that unemployment and male income are more important factors in explaining TFR differences between provinces, as opposed to within them.

The female earnings variable is inconsistent in terms of sign and significance. The insignificance of female earnings can possibly be traced to multicollinearity. When male income, which has a 78 percent correlation with female earnings, is omitted from the regression, female earnings are significant. The *f_earnings* variable remains consistent in terms of the very small size of the impact. The bivariate analysis may be able to shed some light on these inconsistencies. Based on Figures 13, 14, and 15, the relationship between female earnings and TFR does not appear to be consistent in terms of magnitude or size over the time period. It is also possible that since this variable is significant in the fixed effects results but not the pooled OLS results, it may be a more important factor in explaining within-province differences in TFR.

Meanwhile, female labour force participation, though initially significant and positive in the OLS regression, becomes insignificant and negative in the fixed effects regression. In this case, it may indicate the larger impact of female labour force participation on TFR differences between provinces. Further, the percent impact on TFR is halved in the fixed effects model. Again, this inconsistency is reflective of the inconsistent relationship between these variables that was

apparent in my bivariate analysis. Previous research has been mixed with regards to the macro-level relationships between female earnings and female labour force participation and TFR over this time period. As noted in the introduction, the relationship between these variables and TFR has reversed at the macro level in a number of countries since the 1990's (Kohler, 2006, pp.15).

Relative cohort size appears to be a good proxy for tastes in the initial pooled OLS regression, as it appears that a one unit increase in the proportion of 15 to 29 year olds to 30 to 64 year olds (i.e. the more the relative cohort crowding and the less able a cohort is to reach its aspirations), brings about a 25 percent decrease in TFR. This impact is significant in the pooled OLS regression. However, it becomes highly insignificant when inter-provincial trends are controlled for, indicating that it possibly explains between-province differences in TFR but not within-province differences. It also becomes positive in the fixed effects results, which is counter to theoretical predictions and previous research findings. This inconsistency is not surprising in the context of previous findings for Canada which found that since the 1970's, RCS has not been a relevant predictor of fertility.

The variable of most interest in this analysis is unpaid job-protected leave. Both the OLS and fixed effects regressions have found that its impact on fertility is small, positive and significant (at the five percent level for OLS and the ten percent level for fixed effects). This could indicate that bother between and within-province differences in TFR are explained by this variable over time. Respectively, the OLS and fixed effects models indicate that a one week increase in unpaid job-protected parental leave will result in a 0.13 and 0.14 percent increase in TFR. In light of the consistency between the two models, it is plausible to conclude that there is a positive association between this variable and fertility. This finding is supported by relevant theory. Although there is no comparable research at the macro level, these findings do fall in line with micro studies that have controlled for the presence of maternity leave and the implementation of more generous parental leave policies outside of Canada.[16] However, as noted in the bivariate analysis, this coefficient should be interpreted with caution, especially with regards to causality. The inconsistent bivariate findings that could just as easily support a reversed causal relationship between TFR and unpaid job-protected leave cast some doubt on these findings.

[16] These studies include Averett (2001) in the United States and Lalive (2005) in Austria.

5.2.3. Limitations

A key component to understanding why my theory-based hypotheses may not be reflected in my empirical results lies in a discussion of the limitations of this study. Omitted variables are likely a prime candidate for many of the irregularities found in my results. As noted, inter-provincial differences in religion, language, and political ideologies are not controlled for in my model. Additional weaknesses can be found in the choice of proxies for many of the theoretical factors influencing fertility discussed above. The proxy choices were often limited by data availability constraints. The shortcomings of these proxy choices and the model specification are discussed below.

Data Limitations

As outlined in the hypothesis section, people who are most impacted by parental leave policies exhibit specific demographic and socioeconomic characteristics. The ability to narrow down the dependent and independent variables and hone in on these groups would improve my analysis. For instance, with regard to demographic factors, an important consideration is age. Although the ASTFR data is not available provincially prior to 1990, analyzing the relation of annual TFR to ASTFR from this point brings to light some important considerations. From 1990 onwards, the proportion of births in the 20-34 age range accounts for a minimum of 75 percent of all births in a given year, and in most cases around 80 percent. When considering the target population of a family policy, this is an important observation. Data availability did not enable me to narrow my dependent variable down to this particular age-group.

In terms of socioeconomic factors, it is important to consider that parental leave policies and, family policies in general, are often aimed at parents in stable employment. As indicated earlier, maternity benefit qualification has also typically been concentrated among women of at least high school education. As such, the ideal approach would have been to narrow down the dependent variable to this socioeconomic group. In the absence of this ability, income, earnings, and labour force participation variables imperfectly controlled for socioeconomic factors.

The use of maximum unpaid parental leave length as a proxy for indirect cost-reducing policies has a number of limitations. It was recognized previously, that the number of weeks of unpaid

leave for which a mother is eligible does not capture the entire context of parental leave policies in each province. For instance, although Alberta's and Nova Scotia's leave policy lengths now match those of most other provinces, qualification for these leaves is 12 months of continuous employment – much more stringent conditions than in any other province.

There are, however, some more serious limitations to the use of parental leave length. As indicated in the background section, institutional context should ideally be captured holistically, taking into account not only direct and indirect cost-reducing family policy measures, but also the social policy context in general. Capturing this context in a statistical analysis with a few key variables is extremely unlikely, if not impossible.

Model Specification Limitations

As mentioned in the Methods section of this paper, there were shortcomings with respect to model specification. One such shortcoming was assuming away endogeneity. McNown (2003, pp.345) provides a comprehensive discussion of the consequences of ignoring endogeneity in the context of fertility studies. Endogeneity consequences include the potential for inconsistent least squares estimators of model parameters. Though assuming away this issue is undoubtedly flawed, a number of studies that have ignored this issue have also been important contributions to the body of work surrounding determinants of fertility. Butz and Ward (1979), for instance, questionably treat female wages as exogenous in their analysis (McNown, 2003, pp.346).

Ignoring non-stationarity is a further limitation of this study. McNown (2003, pp.244) outlines the potential for spurious inferences about relationships between variables if non-stationarity is ignored. Possible solutions, such as first differencing are mentioned as having been used in various papers on fertility, including Gauthier (1997). However, in the case of my data, the use of first differences did not solve the non-stationarity problem. Once again, however, it is noted by McNown (2003, pp.246) that a number of contributory papers have ignored this issue. This is a concern that I would address with future research.

A further limitation to the model specification involves multicollinearity. It was noted that male income and unemployment and male income and female earnings were highly correlated with each other. In some instances, the removal of a highly correlated variable did impact the sign

and significance of some of the coefficients. However, it was decided that following the theoretical model was key to this analysis, perhaps to the detriment of reliable statistical outputs.

6. Conclusion

The research question posed in this study was straightforward. Its aim was to ascertain whether unpaid job-protected leave, acting as a proxy for the indirect cost-reducing family policy environment, impacted aggregate fertility trends across Canada. The statistical outputs for the econometric model adopted to answer this question superficially provide a straightforward and consistent affirmative response. Closer inspection of the data, model, and results, however, reveals a less definitive answer to the research question. Omitted variables, endogeneity issues, non-stationarity in the data, and the use of imperfect proxies were factors that cast doubt on the outcomes of this statistical analysis. The inconsistency of the multivariate econometric findings with simple bivariate analyses of the variables was an important indicator that further work should be done to correct for the aforementioned problems in future research. Moreover, shortcomings in the institutional proxy suggest that future research should also extend to analysis of other indirect cost-reducing policy factors, such as child care accessibility. Though a causal linkage between unpaid job-protected parental leave and TFR cannot be confirmed, this study provides a starting point for the as yet unexplored territory of the impact of indirect cost-reducing family policies on fertility across Canada.

References

Adamson P 2008, *The child care transition: a league table of early childhood education and care in economically advanced countries*, UNICEF.

Abeysinghe T 1991, "On Testing Easterlin's Hypothesis Using Relative Cohort Size as a Proxy for Relative Income: An analysis of Canadian data", Journal of Population Economics, vol. 4, no. 1, pp. 53-59.

Andersson G 2004, "Do child-care characteristics influence continued child bearing in Sweden? An investigation of the quantity, quality, and price dimension", *Journal of European Social Policy*, vol. 14, p. 407.

Apps P & Rees R 2004, "Fertility taxation and family policy", *Scandinavian Journal of Economics*, vol. 106, no. 4, pp. 745-763.

Averett S L & Whittington L A 2001, "Does Maternity Leave Induce Births?", *Southern Economic Journal*, vol. 68, no. 2, pp.403-417

Baker M 1997, *The restructuring of the Canadian welfare state: ideology and policy*, Social Policy Research Centre, Discussion Paper No. 77.

Banting K 2005, "Canada: nation-building in a federal welfare state," in *Federalism and the Welfare State: New World and European Experiences*, Banting K, ed., Cambridge University Press, Cambridge UK, pp. 89-137.

Becker G S 1960, "An Economic Analysis of Fertility", in *Demographic and Economic Change in Developed Countries*, NBER Conference Series No. 11, Princeton University Press, Princeton, NJ.

Bongaarts J 2008, *What can fertility indicators tell us about pronatalist policy options?*, Vienna Yearbook of Population Research.

Bonoli G 2008, "The impact of social policy on fertility: evidence from Sweitzerland", *Journal of European Social Policy*, vol. 18, p. 64.

Breau S 2007, "Income Inequality across Canadian Provinces in an Era of Globalization: Explaining recent trends", The Canadian Geographer, vol. 51, no. 1, pp. 72-90.

Brewster KL & Rindfuss RR 2000, "Fertility and women's employment in industrialized nations", *Annual Review of Sociology*, vol. 26, pp. 271-296.

Bushnik T 2005, "Child Care in Canada", Statistics Canada Special Surveys Division Research Paper Series no. 003, cat. No. 89-599-MIE2006003.

Butz W P & Ward M P 1979, The Emergence of Counter-cyclical US Fertility", *American Economic Review*, vol. 69, pp.318-328.
Campbell A 2006, "Proceeding with "care": lessons to be learned from the Canadian parental leave and Quebec daycare initiatives in developing a national childcare policy", *Canadian Journal of Family Law*, vol. 22, no. 2, p. 171.

Canada Revenue Agency 2009, *Canada child benefits (including related federal, provincial, and territorial programs): benefits for the period from July 2008 to June 2009*, Canada Revenue Agency, Ottawa, ON, T4114(E) Rev. 08.

Castles FG 2003, "The world turned upside down: below replacement fertility, changing preferences and family-friendly public policy in 21 OECD countries", *Journal of European Social Policy*, vol. 13, p. 209.

Centre for Urban and Community Studies 1990, *Child care information sheets: provinces and territories 1990*, Childcare Resource and Research Unit.

Centre for Urban and Community Studies 1994, *Child care in Canada: provinces and territories 1993*, Childcare Research and Research Unit.

Centre for Urban and Community Studies 1995, *Child care in Canada: provinces and territories 1995*, Childcare Resource and Research Unit.

Cleland J & Wilson C 1987, "Demand theories of the fertility transition: an iconoclastic view", *Population Studies*, vol. 41, pp. 5-30.

Collier C 2007, *Is Canada ready for a new universal social program? Comparing the cases of universal medicare in the 1960s and "universal" child care in the new millennium*.

Cool J 2009, *Child care in Canada: regulated, unregulated, private or public*, Parliamentary Information and Research Service, Library of Parliament, Ottawa, ON, PRB 04-18E.

d'Addio AC & d'Ercole MM 2005, *Trends and determinants of fertility rates in OECD countries: the rolw of policies*, OECD Social, Employment and Migration Working Papers.

DelBoca D & Vuri D 2007, "The mismatch between employment and child care in Italy: the impact of rationing", *Journal of Population Economics*, vol. 20, pp. 805-832.

Duclos E 2001, *A 'natural experiment' on the economics of storks: evidence on the impact of differential family policy on fertility rates in Canada*, Center for Research on Economic Fluctuations and Employment (CREFE).

Duvander AZ & Andersson G 2005, *1 gender equality and fertility in Sweden: a study on the impact of the father's uptake of parental leave on continued childbearing*, Max Planck Institute for Demographic Research, Rostock, Germany.

Easterlin R A & Crimmina E M 1987, "The Fertility Revolution: A Supply-Demand Analysis", *Journal of Economic Literature*, vol. 25, no. 1, pp. 170-171.

Ekert-Jaffe O 1986, *Effets et limites des aides financieres aux families: une experience et un modele*, Institut National d'Etudes Demographiques.

Ekert-Jaffe O, Joshi H, LynchK, Mougin R, & Rendall M 2002, "Fertility, timing of births and socio-economic status in France and Britain", *Population*, vol. 57, pp. 475-507.

Engelhardt H, Kogel T, & Prskawetz A 2004, "Fertility and women's employment reconsidered: a macro-level time-series analysis for developed countries, 1996-2000", *Population Studies*, vol. 58, no. 1, pp. 109-120.

Esping-Andersen G 2007, "The contemporary fertility puzzle," in *Family Formation and Family Dilemnas in Contempoarty Europe*, Gosta Esping-Andersen, ed., Fundacion BBVA, Bilbao, Italy, pp. 13-30.

Finances Quebec 2009, *Status report on Quebec's family policy*, Finances Quebec, Quebec, Canada, 2009-2010 Budget.

Ford D & Nault F 1996, *Changing fertility patterns, 1974 to 1994* Vol 8, No 3.

Friendly M, Beach j, Ferns C, & Turiano M 2000, *Early childhood education and care in Canada 1998*, Centre for Urban and Community Studies, Childcare Resource and Research Unit, 4th Edition.

Friendly M, Beach j, Ferns C, & Turiano M 2002, *Early childhood education and care in Canada 2001*, Centre for Urban and Community Studies, Childcare Resource and Research Unit, 5th Edition.

Friendly M, Beach j, Ferns C, & Turiano M 2005, *Early childhood education and care in Canada 2004*, Centre for Urban and Community Studies, Childcare Resource and Research Unit, 6th Edition.

Friendly M, Beach j, Ferns C, & Turiano M 2006, *Early childhood education and care in Canada 2006*, Centre for Urban and Community Studies, Childcare Resource and Research Unit, 7th Edition.

Friendly M. Non-profit day care is better, studies show.
http://action.web.ca/home/crru/rsrcs_crru_full.shtml?
x=123992&AA_EX_Session=5b885590eee18dc25abdb1f47159d111 . 2-7-2009.
Ref Type: Electronic Citation

Gauthier A 1997, "The impact of amily policies on fertility in industrialized countries: a review of the literature", *Population Research and Policy Reviews*, vol. 26, pp. 323-346.

Gauthier A & Hatzius J 1997, "Family benefits and fertility: an econometric analysis", *Population Studies*, vol. 51, pp. 295-306.

Gauthier A 2001, *The impact of public policies on families and demographic behaviour*, Paper presented at the ESF/EURESCO conference "The second demographic transition in Europe", Bad Herrenalb, Germany, June 23-28, 2001.

Grant J & Hoorens S 2004, *Low fertility and population ageing: causes, consequences, and policy options*.

Gupta ND, Smith N, & Verner M 2006, *Child care and parental leave in the Nordic countries: a model to aspire to?*

Hank K & Kreyenfeld M 2001, *Childcare and fertility in (Western) Germany*, Max Planck Institute for Demographic Research.

Hank K & Kreyenfeld M 2003, "A multilevel analysis of child care and women's fertility decisions in Western Germany", *Journal of Marriage and Family*, vol. 65, pp. 584-596.

Hinde A 2007, *Demographic Methods* Hatchett Llvre UK, London, UK.

Hoem JM 1993, "Public policy as the fuel of fertility: effects of a policy reform on the pace of childbearing in Sweden in the 1980s", *Acta Sociologica*, vol. 36, p. 19.

Human Resources and Skills Development Canada. Length of maternity, parental and adoption leave in Employment Standards Legislation. http://www.hrsdc.gc.ca/eng/lp/spila/clli/eslc/06Rate_of_Maternity_Patental_and_Adoption_Leave.shtml . 2006. Human Resources and Skills Development Canada.
Ref Type: Electronic Citation

Hyatt DE & Milne W 1991, "Can public policy affect fertility?", *Canadian Public Policy*, vol. XVII, no. 1, pp. 77-85.

Kohler HC, Billari F, & Ortega J 2002, "The emergence of lowest-low fertility in Europe during the 1990's", *Population and Development Review*, vol. 28, no. 4, pp. 641-680.

Kohler HP, Billari F, & Ortega JA 2006, "Low fertility in Europe: causes, implications and policy options," in *The Baby Bust: Who Will do the Work? Who Will Pay the Taxes?*, F.R.Harris, ed., Rowman & Littlefield Publishers, Lanham MD, pp. 48-109.

Kravdal O 1996, "How the local supply of day-care centers influences fertility in Norway: a parity-specific approach", *Population Research and Policy Review*, vol. 15, pp. 201-218.

Kwan C C 2002, *Restructuring in the Canadian Economy: A survey of firms*, Bank of Canada Working Paper 2002-8.

Lalive R & Zweimuller J 1996, *Does parental leave affect fertility and return-to-work? Evidence from a 'true natural experiment'*, Institute for Emperical Research in Economics, University of Zurich, Zurich, Switzerland.

Lattimore R & Pobke C 2008, *Recent trends in Australian fertility*, Productivity Commission Staff Working Paper.

Macunovich D 2000, "Relative Cohort Size: Source of a Unifying Theory of Global Fertility Transition?", *Population and Development Review*, vol. no. 26, pp. 235-261.

Marcos CB 2006, *Female labour participation and child care choices in Spain*, Centro de Estudios Andaluces, Working Paper.

McNown R 2003, "A Cointegration Model of Age-Specific Fertility and Female Labor Supply in the United States", *Southern Economic Journal*, vol. 70, no. 2, pp. 344-358.

Mendelson M 2003, *Child benefits levels in 2003 and beyond: Australia, Canada, the UK and the US*, The Caledon Institute of Social Policy.

Milliga K 2001, *Subsidizing the stork: new evidence on tax incentives and fertility*, Department of Economics, University of British Columbia, Working Paper No. 01-21.

Natural Resources Canada. Population Density, 2001.
http://altas.nrcan.gc.ca/site/english/maps/peopleandsociety/population/population2001/density2001/1 . 2001.
Ref Type: Electronic Citation

OECD Publishing. OECD Factbook 2007: economic, environmental and social statistics.
http://puck.sourceoecd.org/vl=432742/cl=17/nw=1/rpsc/factbook2009/index.htm . 2009.
Ref Type: Electronic Citation

Ogwang T & Cho D 2006, *Economic Determinants of the Consumption of Alcoholic Beverages in Canada: A panel data analysis*, Paper presented at the ASAC Conference "Reaching New Heights", Banff, Alberta, June 3-6, 2006.

Oppenheimer V K1976, "The Easterlin Hypothesis: Another Aspect of the Echo to Consider", Population and Development Review, vol. 2, no. 3/4, pp. 433-457

Pampel F C1993, "Relative cohort size and fertility: The socio-political context of the Easterlin Effect", *American Sociological Review*, vol. 58, no. 4, pp. 496-514.

Phipps SA 2000, "Maternity and parental benefits in Canada: are there behavioural implications?", *Canadian Public Policy*, vol. 26, no. 4, pp. 415-436.

Rønsen M 1999, "Assessing the impact of parental leave: Effects on fertility and female employment", in *Parental Leave: Progress or Pitfall? Research and Policy Issues in Europe*, P Moss and F Deven eds., NIDI/CBGS Publications, The Hague/Brussels, vol. 35, pp.193-225.

Schultz TP 2004, "Fertility transition: economic explanations," in *Encyclopidia of the Social and Behavioral Sciences*, Smelser NH & Baltes PB, eds., Elsevier.
Sleebos J 2003, *Low fertility rates in OECD countries: facts and fertility responses*, OECD Publishing, OECD Labour Market and Social Policy Occasional Papers, No. 15.

Sobotka T 2004, "Is Lowest-Low Fertility in Europe Explained by the Postponement of Childbearing?", *Population and Development Review*, vol. 30, no.2, pp. 195–220.

Statistics Canada 1997, *Statistics Canada, Births and Deaths, 1997* Cat. No. 84F0210XPB.

Statistics Canada 1999, *Births, 1998* Cat. no. 84F0210XPB.

Statistics Canada 1999, *Births, 1999* Cat. No. 84F0210XPB.

Statistics Canada 2001, *Income of individuals, by sex, age group and income source, 2006 constant dollars, annual (1,2). Survey of consumer finances - 3502; Survey of labour and income dynamics - 3889* CANSIM Table 202-0407.

Statistics Canada 2001, *Estimates of population, by age group and sex for July 1, Canada, provinces and territories, annual (persons) (1,2,6). Estimates of population by age and sex for Canada, Provinces and Territories - 3604* CANSIM Table 051-0001.

Statistics Canada 2002, *Labour force survey estimates (LFS), by sex and detailed age group, annual (11,12)* CANSIM Table 282-0002.

Statistics Canada. Child care, 1994/95 and 2000/01. http://www.statcan.gc.ca/daily-quotidien/050207/dq050207-eng.pdf The Daily, February 7, 2005. 2005.
Ref Type: Electronic Citation

Statistics Canada 2005, *Induced abortions, by area of report and type of facility performing the abortion, Canada, provinces and territories, annual (number) (1,2,3,9). Therapeutic abortion survey - 3209* CANSIM Table 106-9005.

Statistics Canada 2005, *Live births, crude birth rate, age-specific and total fertility rates, Canada, provinces and territories, annual (1,2). Vital Statistics - Birth Database - 23231* CANSIM Table 102-4505.

Statistics Canada 2006, *Statistics Canada, births and deaths* Cat. No. 84F0210XPB.

Statistics Canada 2006, *Births, 2006* Cat. No. 84F0210X.

Statistics Canada 2007, *Vital statistics - death database - 3233* CANSIM Table 102-0507.

Statistics Canada. Length of maternity, parental and adoption leave in employment standards legislation.
http://www.hrsdc.gc.ca/eng.lp/spila/clli/eslc/o6rate_of_maternity_parental_and_adoption_leave.shtml . 2007.
Ref Type: Electronic Citation

ten Cate A 2003, *The impact of provincial maternity and parental leave policies on employment rates of women with young children in Canada*, McMaster University, Department of Economics, Working Paper Series 2003-03.

Van de Kaa D 2002, *The idea of a second demographic transition in industrialized countries* Paper presented at the Sixth Welfare Policy Seminar of the National Institute of Pupoulation and Social Security, Tokyo, Japan, January 29.

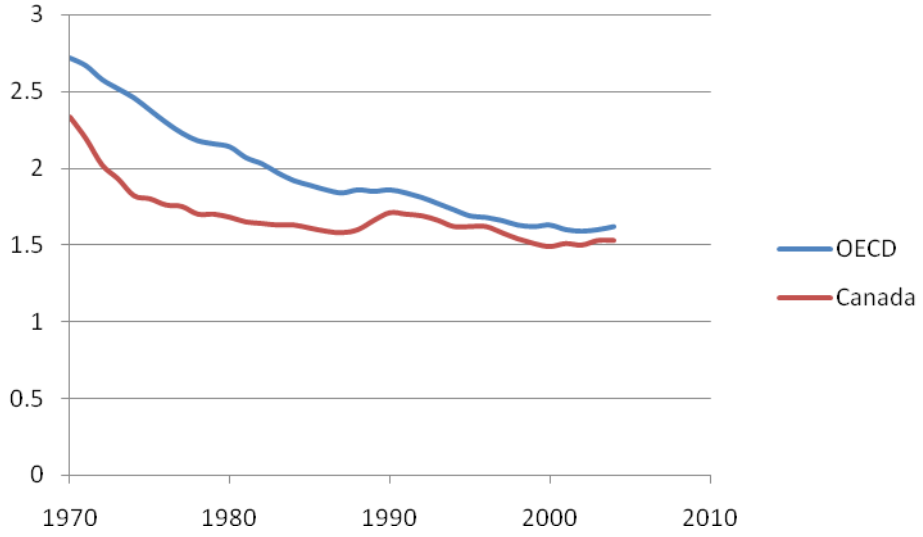
Winegarden C R & Bracy P M 1995, “Demographic Consequences of Maternal-Leave Programs in Industrial Countries: Evidence from Fixed-Effects Models”, Southern Economics Journal, vol. 61, no. 4, pp. 1020-1035.

Yasuoko M & Miyake A 2008, *Fertility rate and childcare policies*, Faculty of Economics and Business Administration, The University of Kitakyusku.

Zhang J, Quan J, & van Meerbergen P 1994, "The effect of tax-transfer policies on fertility in Canada, 1921-88", *The Journal of Human Resources*, vol. 29, no. 1, pp. 181-201.

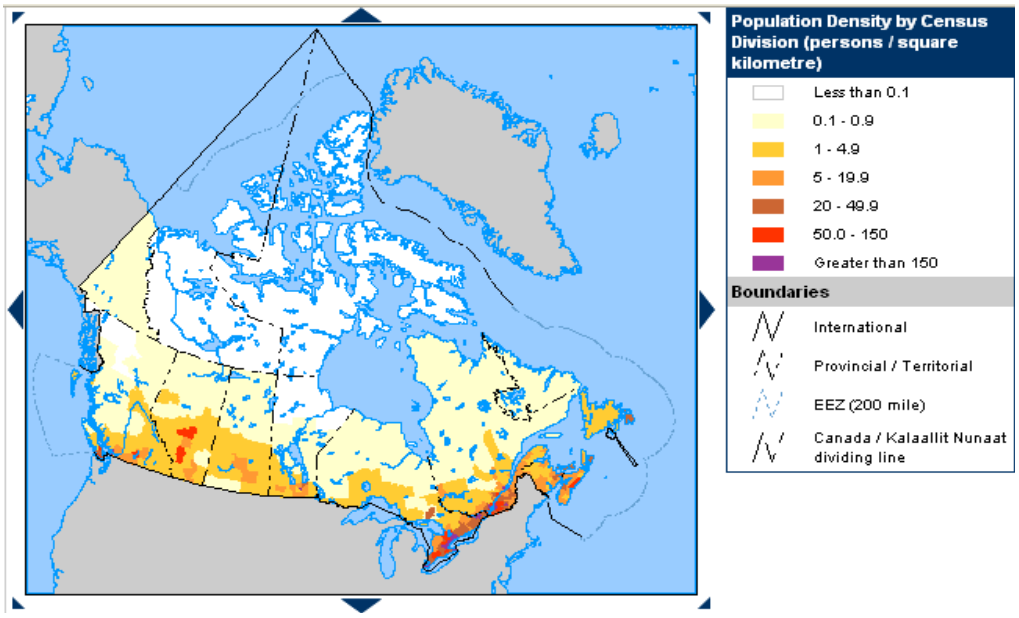
FIGURES

Figure 1: Total Fertility Rate in OECD Countries and Canada, 1970-2004



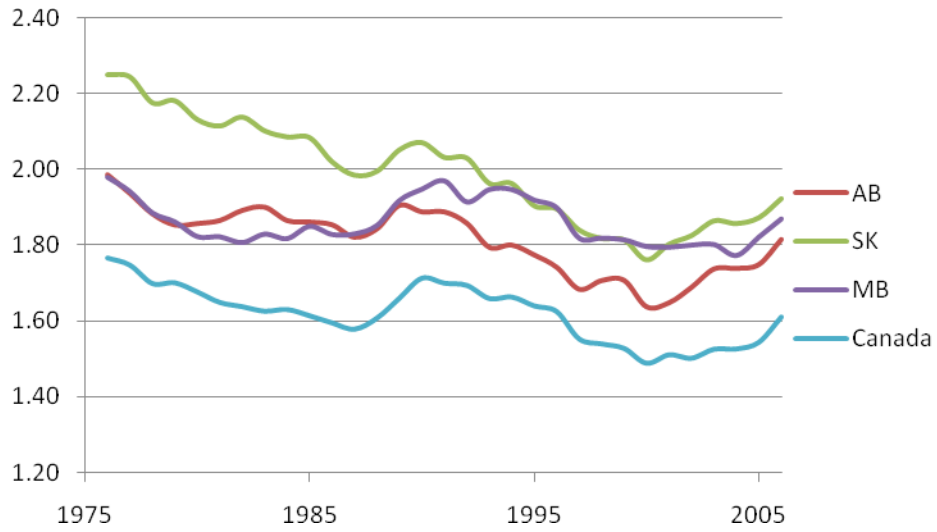
Source: OECD Publishing, 2009

Figure 2: Population Density of Canada



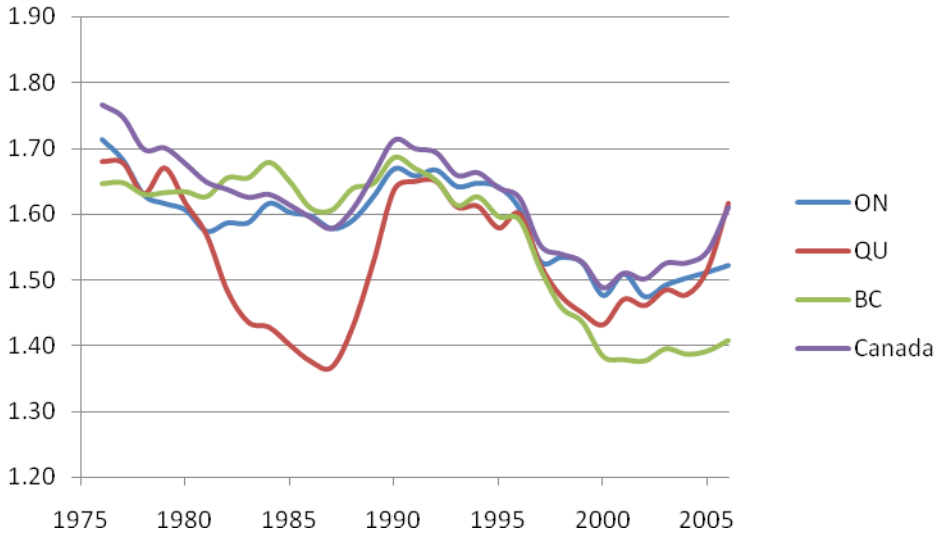
Source: Natural Resources Canada, 2001

Figure 3: Prairie Provinces Total Fertility Rates, 1976-2006



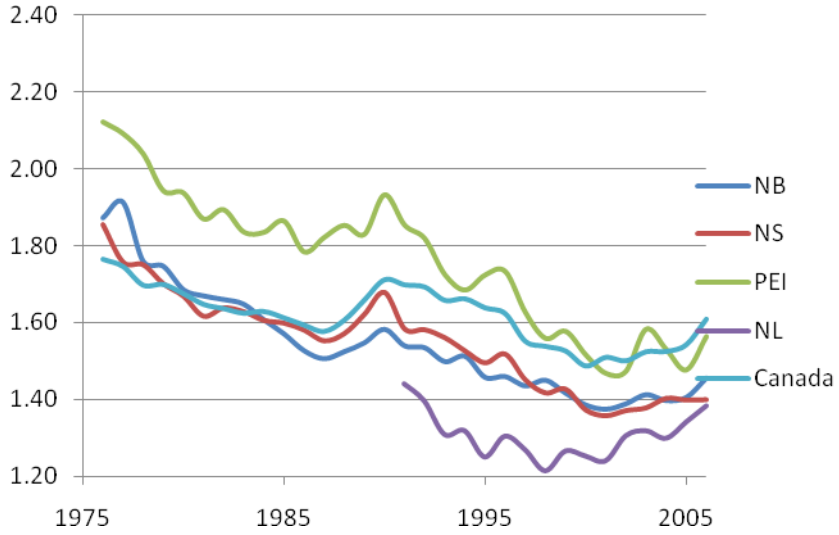
Source: Adapted from Statistics Canada, 1998, 1999, 2001, 2006

Figure 4: Central Canada and BC Total Fertility Rates, 1976-2006



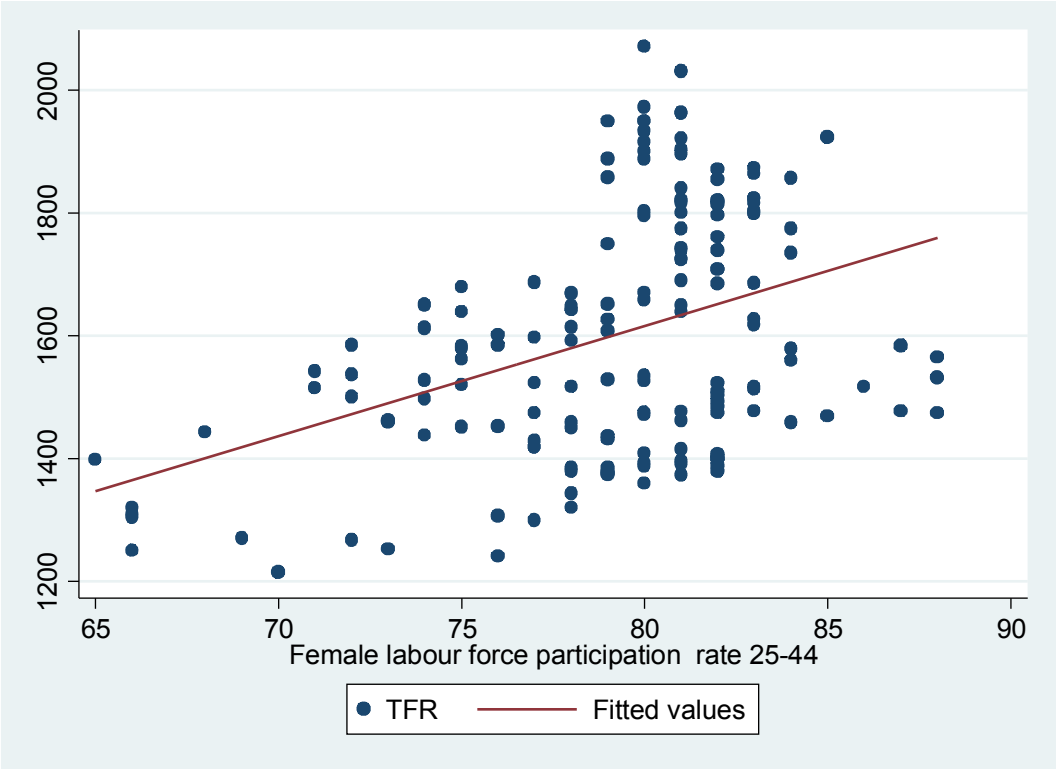
Source: Adapted from Statistics Canada, 1997, 1999, 2001, 2006

Figure 5: Maritime Provinces Total Fertility Rates, 1976-2006



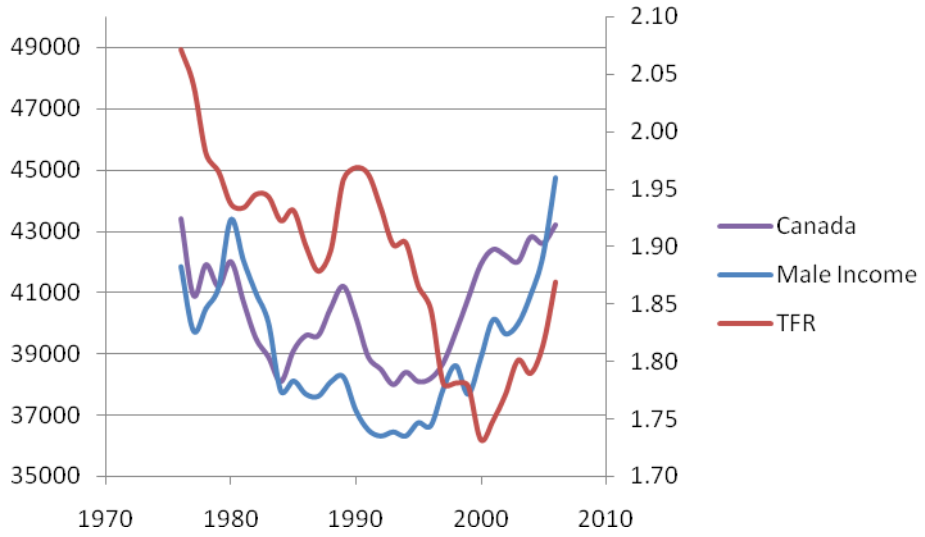
Source: Adapted from Statistics Canada, 1997, 1999, 2001, 2006

Figure 6: Correlation between TFR and Female Labour Force Participation in Canada, 1990-2006



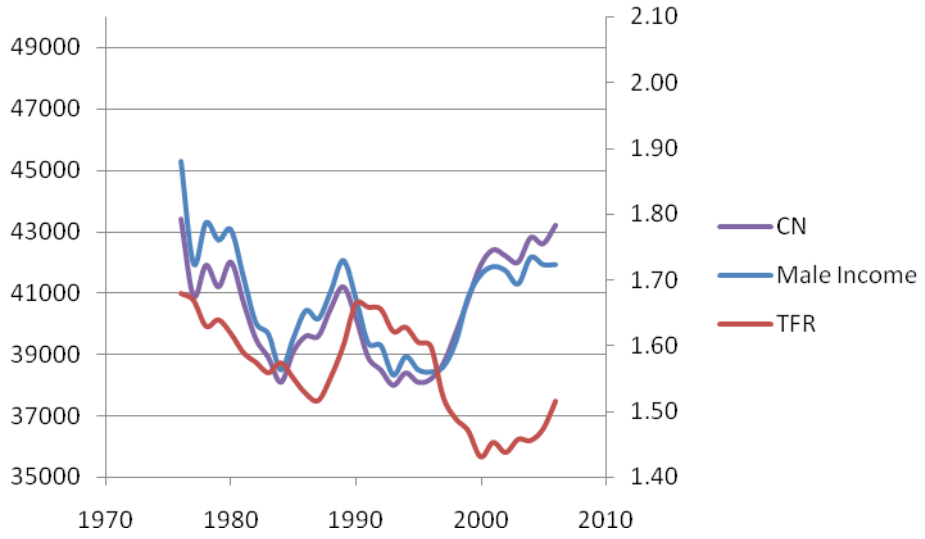
Source: Adapted from Statistics Canada, 2006

Figure 7: Prairie Province Male Income and TFR, 1976-2006



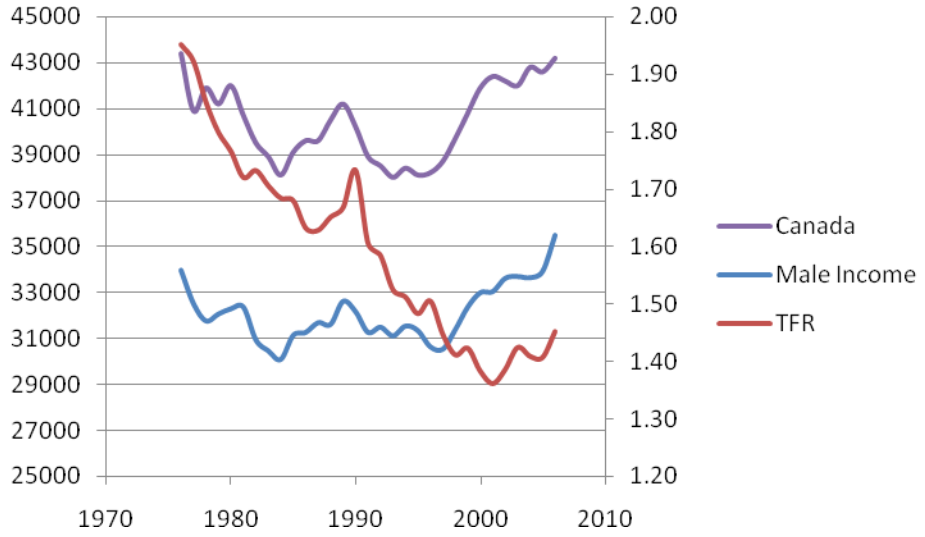
Source: Adapted from Statistics Canada, 1997, 1999, 2001, 2006

Figure 8: Central Canada and British Columbia Male Income and TFR, 1976-2006



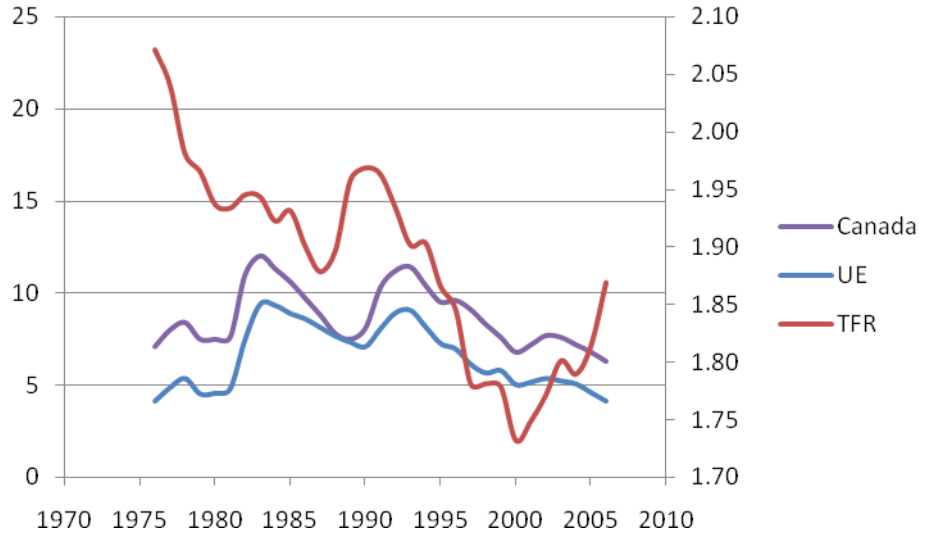
Source: Adapted from Statistics Canada, 1997, 1999, 2001, 2006

Figure 9: Maritime Provinces Male Income and TFR, 1976-2006



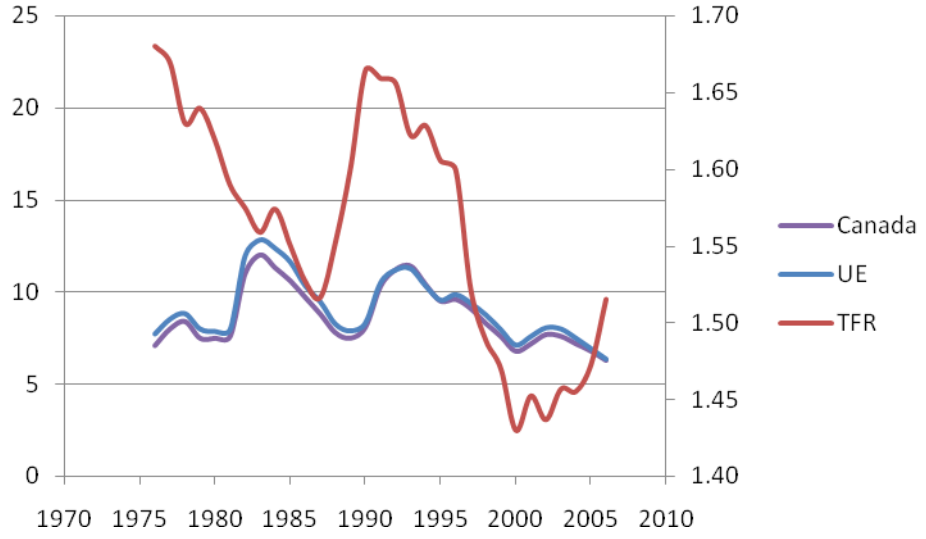
Source: Adapted from Statistics Canada, 1997, 1999, 2001, 2006

Figure 10: Prairie Province Unemployment Rate and TFR, 1976-2006



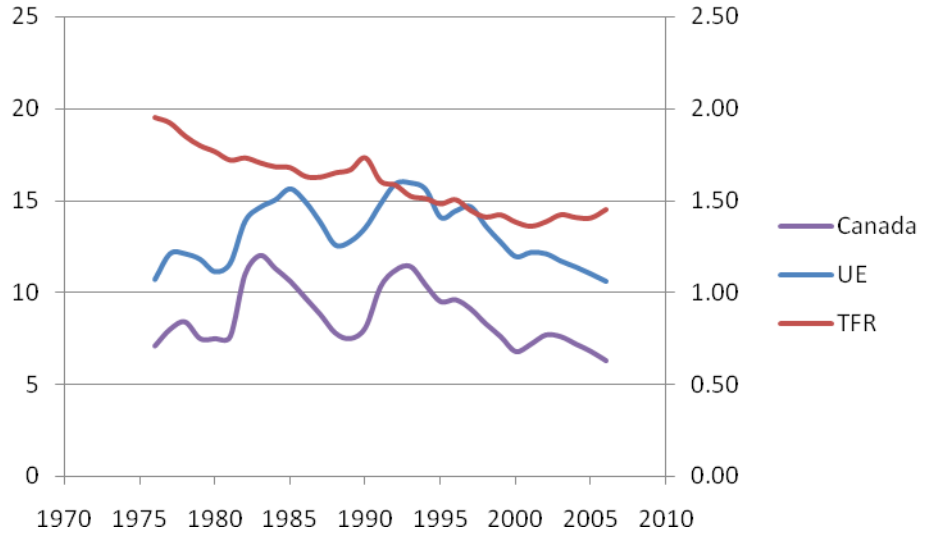
Source: Adapted from Statistics Canada, 1997, 1999, 2001, 2006

Figure 11: Central Canada and British Columbia Unemployment Rate and TFR, 1976-2006



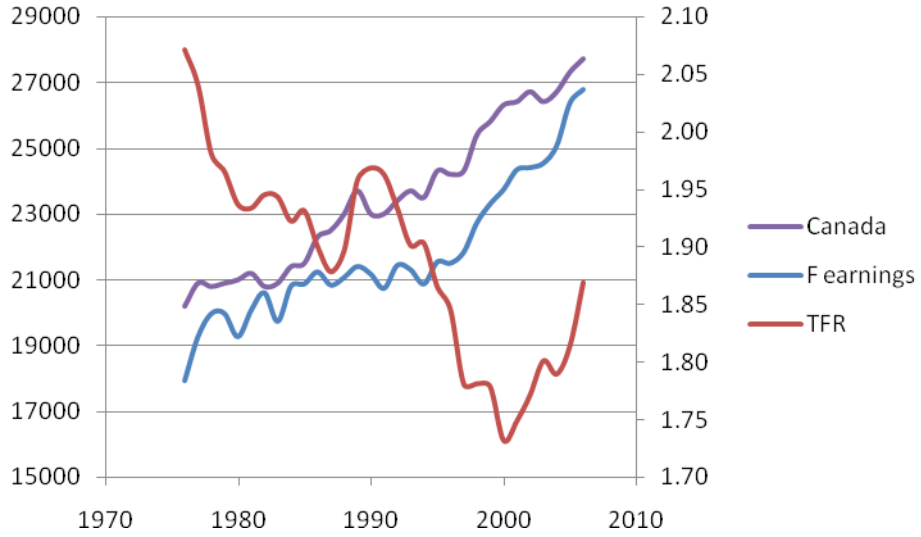
Source: Adapted from Statistics Canada, 1997, 1999, 2001, 2006

Figure 12: Maritime Unemployment Rate and TFR, 1976-2006



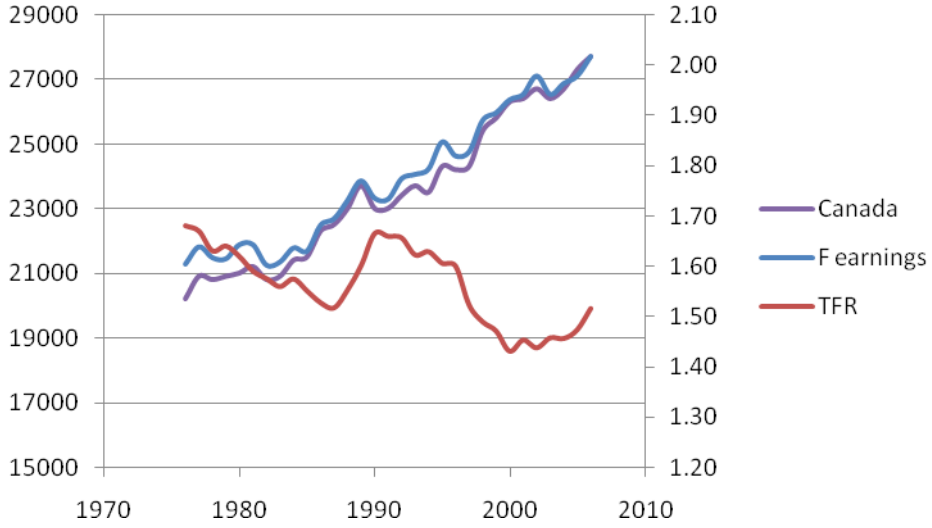
Source: Adapted from Statistics Canada, 1997, 1999, 2001, 2006

Figure 13: Prairie Province Female Earnings and TFR, 1976-2006



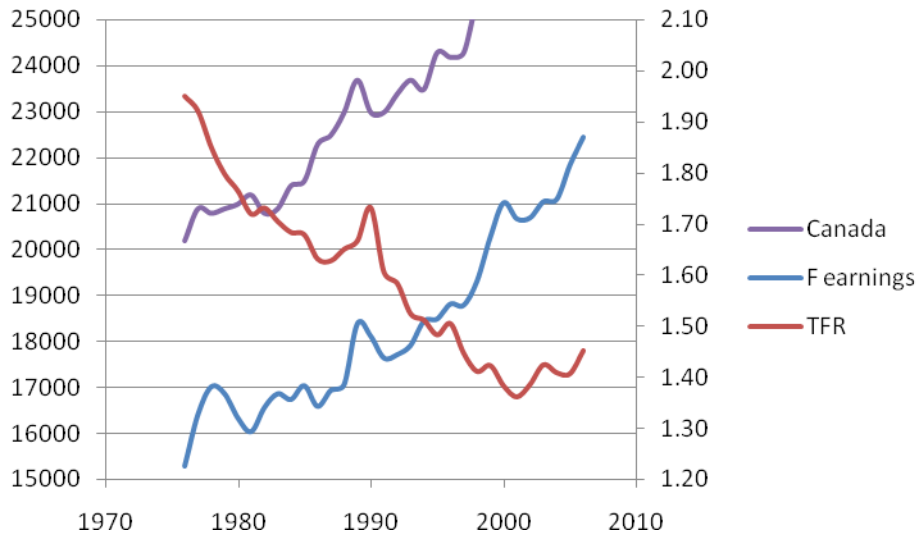
Source: Adapted from Statistics Canada, 1997, 1999, 2001, 2006

Figure 14: Central Canada and British Columbia Female Earnings and TFR, 1976-2006



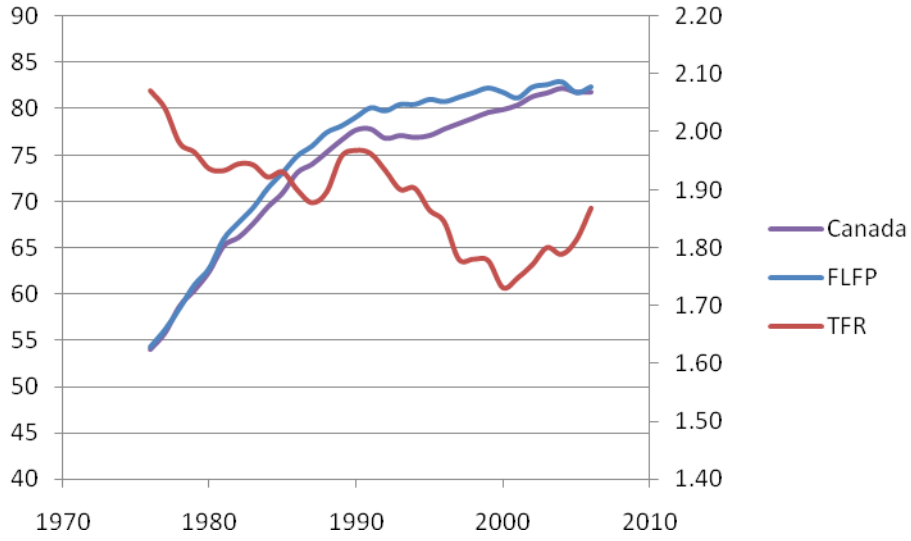
Source: Adapted from Statistics Canada, 1997, 1999, 2001, 2006

Figure 15: Maritime Female Earnings and TFR, 1976-2006



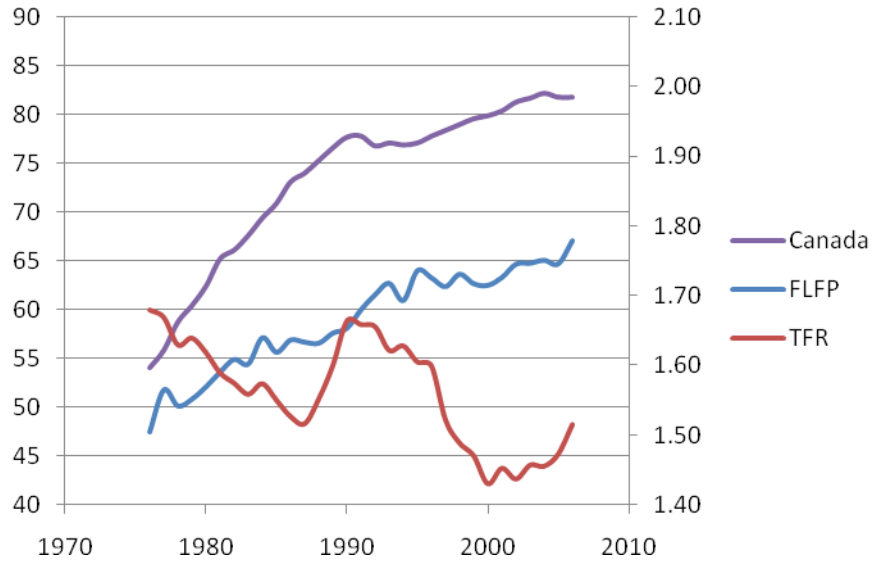
Source: Adapted from Statistics Canada, 1997, 1999, 2001, 2006

Figure 16: Prairie Provinces Female Labour Force Participation and TFR, 1976-2006



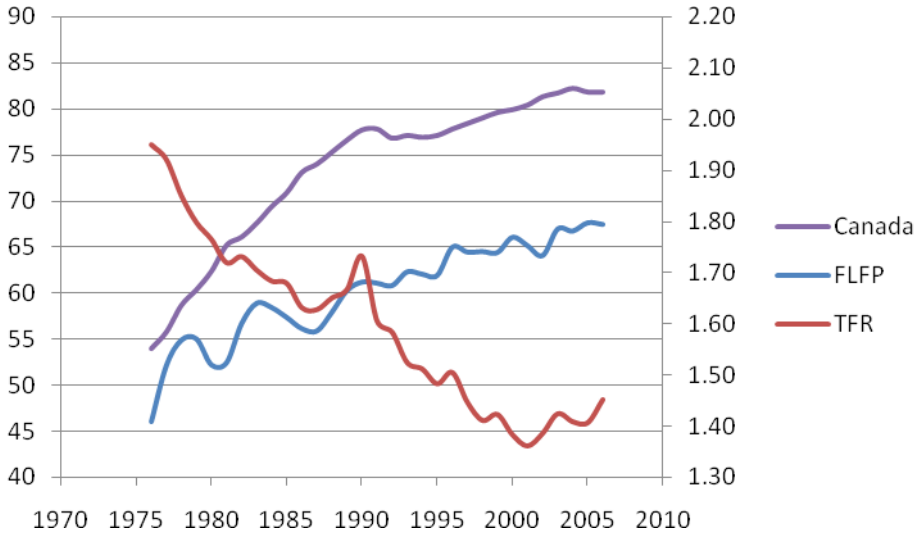
Source: Adapted from Statistics Canada, 1997, 1999, 2001, 2006

Figure 17: Central Canada and British Columbia Female Labour Force Participation and TFR, 1976-2006



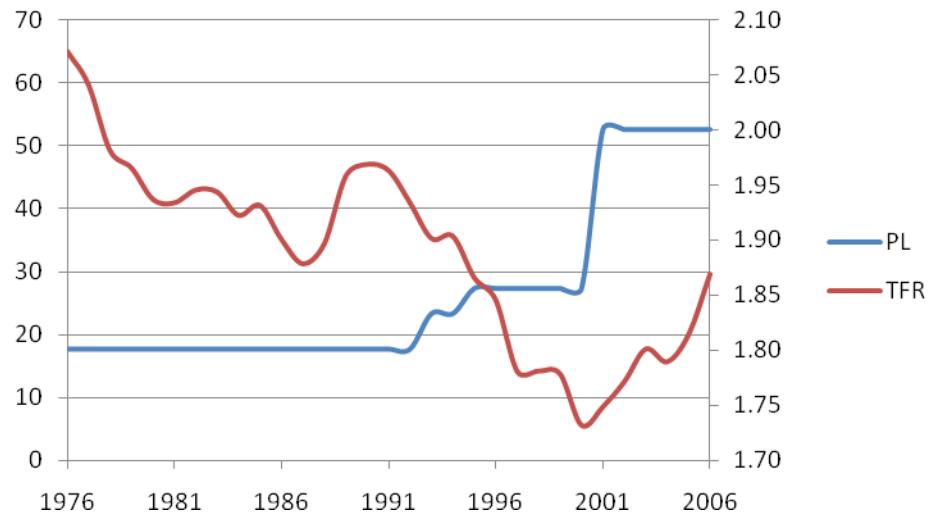
Source: Adapted from Statistics Canada, 1997, 1999, 2001, 2006

Figure 18: Maritime Female Labour Force Participation and TFR, 1976-2006



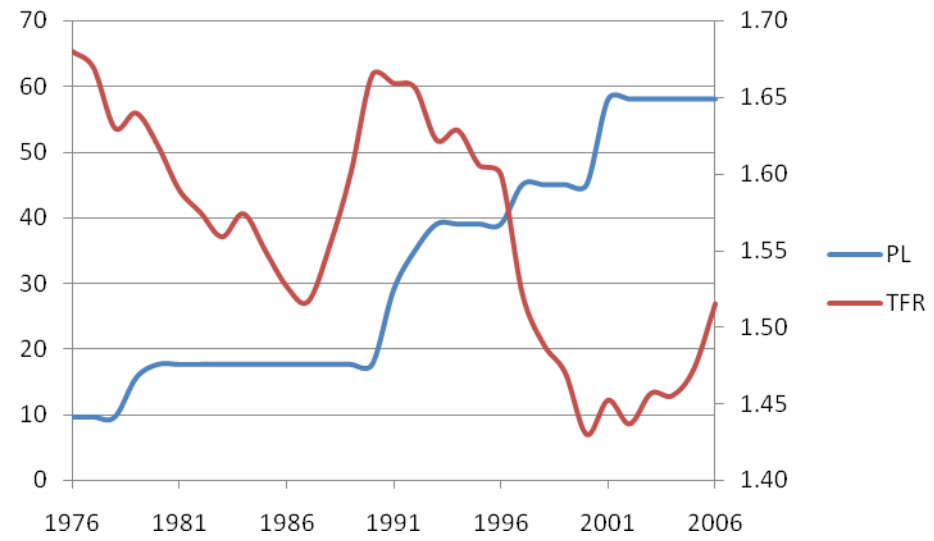
Source: Adapted from Statistics Canada, 1997, 1999, 2001, 2006

Figure 19: Prairie Provinces Job-Protected Leave and TFR, 1976-2006



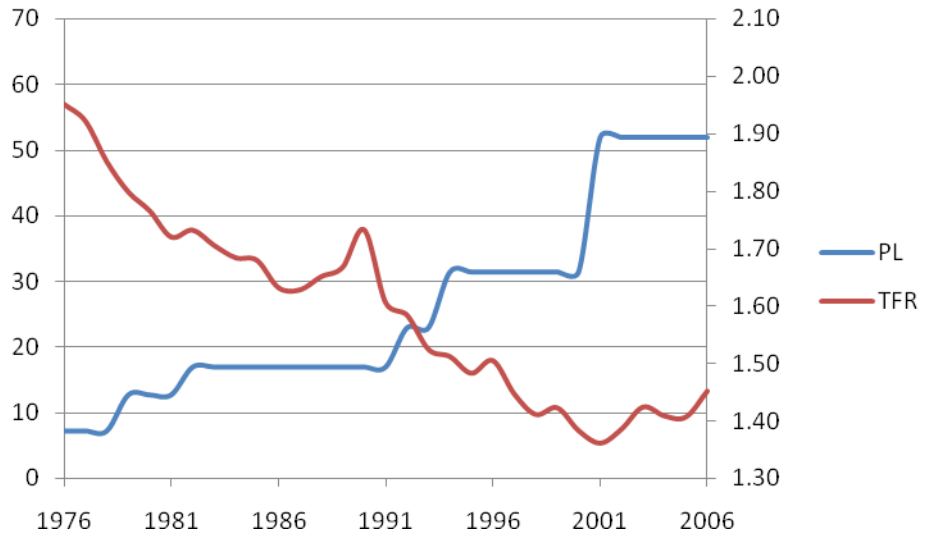
Source: Adapted from Statistics Canada, 1997, 1999, 2001, and 2006 and ten Cate, 2003

Figure 20: Central Canada and British Columbia Job-Protected Leave and TFR, 1976-2006



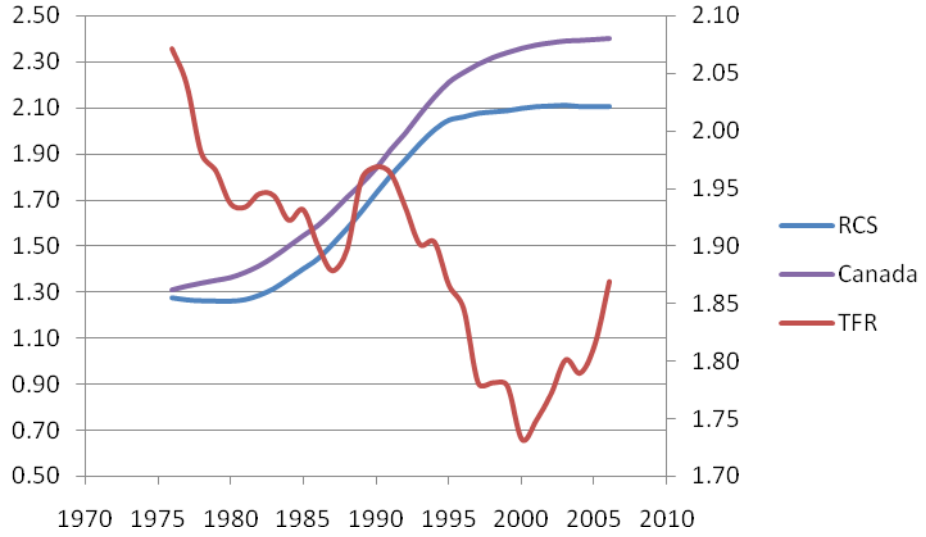
Source: Adapted from Statistics Canada, 1997, 1999, 2001, and 2006 and ten Cate, 2003

Figure 21: Maritime Job-Protected Leave and TFR, 1976-2006



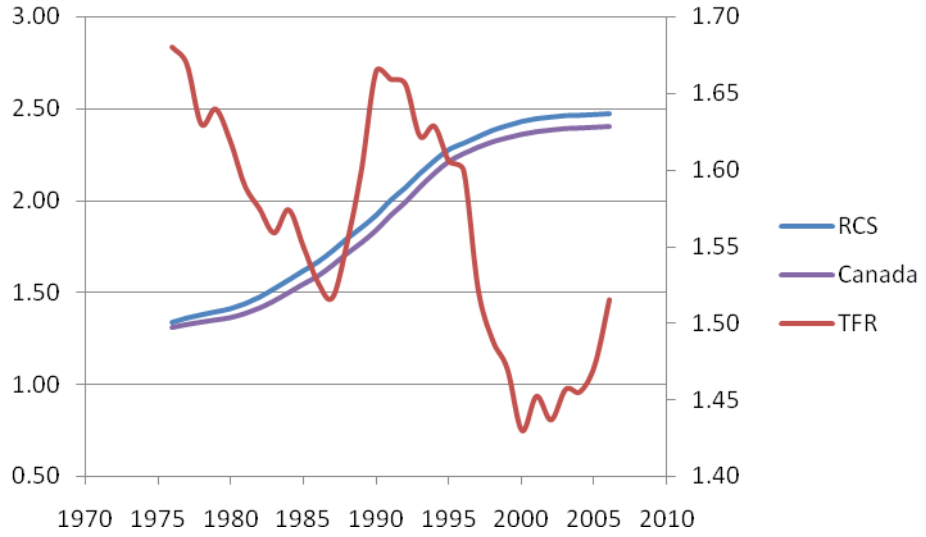
Source: Adapted from Statistics Canada, 1997, 1999, 2001, and 2006 and ten Cate, 2003

Figure 22: Prairie Province Relative Cohort Size and TFR, 1976-2006



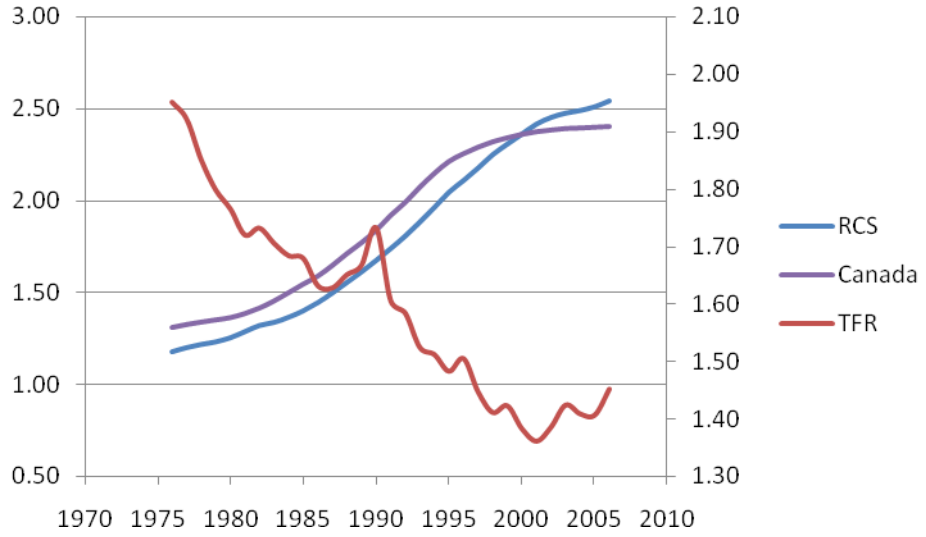
Source: Adapted from Statistics Canada, 1997, 1999, 2001, and 2006

Figure 23: Central Canada and British Columbia Relative Cohort Size and TFR, 1976-2006



Source: Adapted from Statistics Canada, 1997, 1999, 2001, and 2006

Figure 24: Maritime Relative Cohort Size and TFR, 1976-2006



Source: Adapted from Statistics Canada, 1997, 1999, 2001, and 2006

TABLES

Table 1: Provincial GDP per Capita, 2007

Province	2007 GDP/Capita (2002 Dollars)
British Columbia	37,258
Alberta	54,540
Saskatchewan	39,624
Manitoba	35,093
Ontario	41,616
Quebec	34,555
New Brunswick	30,960
Nova Scotia	31,089
Prince Edward Island	29,785
Newfoundland	38,193

Source: Adapted from Statistics Canada, 2001

Table 2: Family Benefits of the Provinces, 2009 (dollars)

Province	Maximum Amount				Income ceiling at which reduction applies	Reduction Rate
	1st Child	2nd Child	3rd Child	4th and subsequent child		
Newfoundland and Labrador	257	335	360	386	17397	5.1%, 6.7%, 7.2% or 7.72%
	Supplement for children under 1 year: 540 Bonus at birth: 90					
Prince Edward Island	n.a	n.a	n.a	n.a	n.a	n.a
Nova Scotia	445	645	720	720	16000	9.04%, 22.15%, 36.78% or 51.4%
New Brunswick	250	250	250	250	20000	2.5% or 5%
Quebec	2166	1083	1083	1623	32696 (single) 44599 (couple)	4%
Ontario	804	804	804	804	20000	8%
Alberta	694	631	379	127	33873	4%
Manitoba	360	360	360	360	Depending on the number of children	$12 for every $48
Saskatchewan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
British Columbia	1332	1332	1332	1332	20500	9% and 18%

Source: Finances Quebec, 2009, pp.9

Table 3: Job-Protected Parental Leave across Canada, 2006

Jurisdiction	Maternity Leave	Parental Leave	Maximum Job-Protected Leave (Maternity and Parental)	Continuous Employment Requirements	Both Parents Able to Take Full Leave
Federal	17	37	52	6 months	No
British Columbia	17	37	52	None	Yes
Alberta	15	37	52	12 months	No
Saskatchewan	18	37	52	20 weeks in past year	Yes
Manitoba	17	37	54	7 months	Yes
Ontario	17	37	52	13 weeks	Yes
Quebec	18	52	70	None	Yes
New Brunswick	17	37	52	None	No
Nova Scotia	17	52	52	12 months	Yes
Prince Edward Island	17	35	52	20 weeks	No
Newfoundland	17	35	52	20 weeks	Yes

Source: Statistics Canada, 2007

Table 4: Child Care Overview across Canada, 2006

Province	% Coverage with Regulated Child Care Spaces	% Regulated that are Not-for-Profit	Median or Mean Monthly Parent Fees for Full-Time Care, Preschoolers (3-5)
British Columbia	13.51	58*	550
Alberta	12.14	51	573
Saskatchewan	5.40	100	420
Manitoba	13.33	94	376**
Ontario	11.92	77	541
Quebec	34.54	87	150
New Brunswick	13.26	36	467
Nova Scotia	10.42	54	716
Prince Edward Island	20.21	44	428
Newfoundland	8.57	31	455

*Information not available for 2006. 2001 value used instead

**Information not available for 2006. 2004 value used instead

Source: Early Childhood Education Centre, various years

Table 5: Summary of Literature Reviewed

Country	Author/ year	Data	Methods of analysis	Dependent variable	Policy variable
Parental Leave Policies					
United States	Averett 2001	National Longitudinal Study of Youth, 1985 to 1992	Logistic regression	Probability of a birth	Presence of paid or unpaid maternity leave
Sweden	Duvander, 2005	Micro-data from Swedish population register from 1988-99	Event-history analysis	Second and third births	Father's and mother's uptake of parental-leave benefits
Austria	Hoem, 2001	Austrian Family and Fertiity Survey 1995-1996	Hazard regression	Probability of third birth	Parental leave policy
Austria	Lalive, 2005	Austrian Social Security Dataset, 1990	Regression discontinuty analysis	Probability of having a child within the 3-year period following changes in policy	Parental leave policy
Canada	Phipps, 2000	Micro-data from 1988/89/90 Labour Market Activities Survey	Probit model	Probability a woman will have a baby	Availability of maternity leave benefits
Finland and Norway	Ronsen, 1999	1998 Norwegian Family and Occupation Survey and 1998 Finnish Population Survey	Hazard-rate analysis	Probability of birth	Parental leave policy
OECD countries	Winegarden, 1995	Macro data, 17 OECD countries in 1959, 1969, 1979, and 1989	Fixed-individual effects method	General fertility rate, infant mortality rate, and female labour force participation rate	Maternity leave benefits
Child Care Policies					
Sweden	Andersson, 2004	Register data 1997-1998	Event-history analysis	Probability of a second and third birth	Regional childcare characteristics
Switzerland	Bonoli, 2008	Macro data, 26 cantons	Multivariable OLS	TFR average 3 years	Day care centers per capita, level of family benefits
OECD countries	Castles, 2003	Aggregate data from 1960's to 1990's	Cross country regressions	Period total fertility rates	Proportion of children using child-care, flexible work arrangements,

Country	Author/ year	Data	Methods of analysis	Dependent variable	Policy variable
					social policy expenditure
Italy	Del Boca, 2007	Italian datasets, the SHIW and the Multiscopo survey	Bivariate probit model	Female labour force participation, use of child care	Child care cost
Nordic countries	Gupta, 2006	Macro data trends in Nordic countries	Literature review and analysis	Impact on labour supply, gender equity, fertility, child welfare, and financial costs	Child care and parental leave
Germany	Hank, 2003	German Socio-Economic Panel (GSOEP) micro-data from 1984 to 1995 linked with official statistics on the regional day-care provision	Multilevel discrete-time logit models	Transition to first child	Availability of public day care and informal private day care arrangements (i.e., social networks)
Norway	Kravdal, 1996	Family and Occupation Survey 1988	Logistic regression	Probability of a first second and third birth	Provision of day-care facilities
Cash Transfers/Tax Incentive Policies					
Germany, Italy, Spain	Apps, 2004	Aggregate data	Application of a household consumption model	Total fertility rate	Child care availability, child payments, taxation
OECD countries	d'Addio, 2005	Aggegate data	Pooled OLS estimator, generalized method of moments, and Pooled Mean Group estimator	Logged TFR	Differential tax rates, parental leave length and benefits, public spending on leave benefits
Canada	Duclos, 2001	Series of yearly repeated cross-sectional data sets in Quebec	Linear probability model, parity specific regressions	Probability of transitioning from one parity to another	Newborn universal allowances, tax credits for dependent children, and family income tax reductions
France	Ekert, 1986	Aggregate data from 1970's	Multivariate OLS	Logged TFR	Family benefits
France	Ekert, 2002	French Permanent Demographic Sample (EDP), longitudinal panel data	Logistic regression	Parity progression ratios and annual probabilities of giving birth	Gender equity policy
OECD countries	Gauthier. 1997	Aggregate data from 1970-1990	Fixed-effects estimator	Logged TFR	Ratio of family payments to average weekly earnings, maternity leave

Country	Author/ year	Data	Methods of analysis	Dependent variable	Policy variable
					time and payment
Sweden	Hoem, 1993	Official statistics from 1961-1990	Indirect standardization	Parity-specific birth rate	Parental leave benefits
Canada	Hyatt, 1991	Macro data from 1948-1986	Multivariable OLS	Logged TFR	Maternity leave benefits, ongoing family payments
Canada	Milligan, 2001	Micro data, 1991 and 1996 PUMF-F report information on a sample of 345,351 and 342,231 families	Multinomial logit	Whether a woman had a child	Availability of the Quebec baby bonus
Japan	Yasuoko, 2009	Aggregate data from Asia and Western Europe	Application of a growth model	Total fertility rate	Child allowance, reduction in care time for children, and education subsidies
Canada	Zhang, 1994	Aggregate data from 1921 to 1983	Ordinary least squares	Total fertility rate	Tax exemption, tax credit , family allowance, maternity leave benefits

Table 6: Results of Studies Included in the Literature Review

Author	Country	Year	Impact on fertility			Labour supply effect
			Child care	Parental leave	Financial benefits	
Parental Leave Policies						
Averett	United States	2001		++		
Duvander	Sweden	2005		+		
Hoem	Austria	2001		n.s.		
Lalive	Austria	2005		++		++
Ronsen	Finland, Norway	1999		+		
Winegarden	OECD countries	1995		+		++
Child Care Policies						
Andersson	Sweden	2004	n.s.			
Bonoli	Switzerland	2008	++		++	
Castles	OECD countries	2003	++			
Del Boca	Italy	2002	++			
Del Boca	Italy	2007				++
Gupta	Nordic countries	2006	+	+		
Hank	W. Germany	2003	n.s.			
Kravdal	Norway	1996	+			
Benefits/Cash Transfers/Tax Incentive Policies						
Apps	OECD countries	2004	+		+	+
D'Addio	OECD countries	2005	++	++	++	+
Duclos	Canada	2001			++	
Ekert	France	1986			+ +	
Ekert	France and Britain	2002			+	
Gauthier	OECD countries	1997	+	n.s.	+	
Hoem	Sweden	1993			+	
Hyatt	Canada	1991			+	
Milligan	Canada	2001			++	
Yasuoko	Japan	2008	+		+	
Phipps	Canada	2000		n.s.		n.s.
Zhang	Canada	1994			++	

Table 7: Predicted Relationships of Variables with TFR

Variable	Predicted Relationship with TFR
Male income	+ *
Female earnings	- *
Female labour force participation	- *
Unemployment	- *
Parental leave length	uncertain
Relative cohort size	+

*This impact may be offset depending on the institutional environment

Table 8: Variable Data Sources and Sample Sizes

Dependent variable	Source	Sample Size
Total fertility rate	1974-1994: Ford (1996) 1995-1999: Statistics Canada Cat. No. 84F0210XPB 2000-2006: CANSIM table 102-4505	30 years, 9 provinces 16 years, 1 province
Independent variables		
Demand Factors	**Source**	**Sample Size**
Average total male income	1976-2006: CANSIM Table 202-0407	30 years, 10 provinces
Average total female income	1976-2006: CANSIM Table 202-0407	30 years, 10 provinces
Female labour force participation rate	1976-2006: CANSIM Table 202-0407	30 years, 10 provinces
Parental leave length	1976-2000: Cate (2003) 2000-2006: HRSDC (2006)	30 years, 10 provinces
Relative cohort size	1976-2006: CANSIM Table 102-0507	30 years, 10 provinces

Table 9: Summary Statistics by Region

Prairies					
Variable	**Observations**	**Mean**	**St. Dev**	**Min**	**Max**
ltfr	93	0.6336	0.05606	0.4947	0.81093
lagleave	90	25.8111	13.1874	17	54
lagunemp	90	6.62556	1.81663	3.8	11.3
lagmincome	90	38957.8	4260.19	33100	49900
lagf_earnings	90	23175.6	2077.18	18800	31900
lagflfp	90	74.8933	8.78953	51.1	84
lagRCS	90	1.71522	0.35548	1.11	2.19
Central Canada and BC					
Variable	**Observations**	**Mean**	**St. Dev**	**Min**	**Max**
ltfr	93	0.4446	0.0619	0.31481	0.53649
lagleave	90	30.9667	19.1343	0	70
lagunemp	90	9.20444	2.31269	5	15
lagmincome	90	40751.1	3514.41	34200	49300
lagf_earnings	90	25793.3	2002.18	22600	33300
lagflfp	90	73.0678	8.3789	48.4	83
lagRCS	90	1.94567	0.42062	1.28	2.54
Maritimes					
Variable	**Observations**	**Mean**	**St. Dev**	**Min**	**Max**
ltfr	109	0.4456	0.12669	0.19062	0.75142
lagleave	120	25.217	14.6993	0	52
lagunemp	120	13.298	2.94714	8.4	20.2
lagmincome	120	31990.9	2315.13	27600	37500
lagf_earnings	120	20251.7	1715.28	16300	24700
lagflfp	120	68.9083	11.6437	37.5	88
lagRCS	**120**	**1.7845**	**0.47386**	**1.06**	**2.64**

Table 10: Impact of Independent Variables on TFR, OLS and Fixed Effects Models

	OLS[1]			Fixed Effects[1]		
Variable	**Coefficient**	**% change**	**p-value[2]**	**Coefficient**	**% change**	**p-value[2]**
lag_leave	0.0013094***	0.131025764	0.001	0.0013923*	0.13932697	0.079
lag_unemp	-0.0238689***	-2.35862908	0.000	-0.0021572	-0.2154875	0.633
lag_m_income	-8.83E-06***	-0.000882996	0.000	-1.65E-06	-0.000165	0.648
lag_f_earnings	-1.98E-06	-0.000198	0.325	3.65E-06**	0.000365	0.031
lag_flfp	0.0096509***	0.969762011	0.000	-0.0047656	-0.4754263	0.113
lag_RCS	-0.2909189***	-25.2423696	0.000	0.0451972	4.62341569	0.614
Constant	0.8393281	n/a	0.000	0.7901597	n/a	0.028
F-statistic	0.000			0.000		
No. Observations	286			286		
R-Squared within	n/a			0.7226		
between	n/a			0.1056		
overall	0.812			0.0867		

[1]Year dummies are included in each regression
[2]Standard errors are robust to heteroskedasticity
*** Coefficient is significant at the 1 percent level
**Coefficient is significant at the 5 percent level
*Coefficient is significant at the 10 percent level