An Econometric Analysis of the Effects of the Expanded UCCB on Women's Labour Supply

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Abstract

This paper mainly investigates the average marginal effects of the expansion of the Universal Child Care Benefit (UCCB) on the labour supply decisions of Canadian women whose youngest child is aged between 6 and 17, using the Labour Force Survey Public Use files for the time periods January to June 2014 and January to June 2015. I apply the difference-in-differences method to estimate probit models by education level for the full sample and for samples of childless women and women with children respectively. I find a positive marginal effects of the UCCB on women's labour supply that is significant at least the 10% level for highly educated women, in both samples. However, the average marginal effect of the expansion of the UCCB on the likelihood of being employed is negative and statistically significant for women with a lower education level. The results also show economically and statistically significant average marginal effects of other characteristics on women's labour supply decisions.

1. Introduction

For the purpose of reducing child poverty and reducing social well-being, many kinds of social assistance and child benefits have been implemented by developed countries, especially by OECD countries. Since the implementation of these child care benefit policies, a large number of studies have focused on the effects of different child care benefit policies on women's labour supply, because women play an important role in both families and communities that might constrain their participation in labour market activities. Since its launch in 2006, the impacts of the Universal Child Care Benefit (UCCB) policy have become a popular economic topic in Canada. Under this policy, a $100 monthly payment per child is provided to parents with children under the age of 6. However, this small monthly payment has become a huge government expenditure over time (Friendly, 2013). Schirle (2013) studies the effect of the UCCB on individual labour market behaviour on both the intensive and extensive margins. She uses the simple labour-leisure theoretical model to predict that income transfer policies such as the UCCB would probably induce individuals to leave the labour market.

However, the Canadian government announced an increase and expansion of the UCCB in October 2014. The existing UCCB is enhanced by providing up to $1,920 per year for each child under the age of 6, and a new benefit of up to $720 per year for children aged 6 through 17. Assuming all eligible families receive the UCCB, the total net UCCB federal expenditure is estimated to be $3.5 billion in 2014-2015. This will rise to $6.7 billion in 2015-2016; that is, once the enhanced UCCB has been implemented for a full fiscal year (Malanik, 2015).

With respect to the expansion of the UCCB, in this paper I am more interested in the effects on newly eligible families with children aged between 6 and 17. Unfortunately, there has been

little research on the expanded UCCB policy because it just came into effect in July 2015. Thus, based on the results in Schirle's (2013) study, this paper will focus on short-term the changes in the labour supply behaviour of married women whose youngest child is aged between 6 and 17 in reaction to the expansion of the UCCB. This paper will contribute to the existing literature related to childcare benefits and women's labour supply and can also serve as a reference to fill the gap in the literature about the newly expanded UCCB.

The data used in this paper are from the Labour Force Survey (LFS) during the periods January 2014 to June 2014 and January 2015 to June 2015. After a descriptive analysis, I provide a general overview of the labour supply behaviour of the women in my samples, differentiating by education level. Based on the difference-in-differences method, a probit regression model will examine the relationships between the expansion of the UCCB, individual characteristics and changes in labour supply behaviour by married women whose youngest child is aged between 6 and 17.

Section 2 provides some background on different types of child care benefit policies in Canada and the trend in women's labour force participation and employment in recent years. Moreover, I will review previous studies to consider which methodology I should use in this paper and provide some expectations regarding the results. Sections 3 and 4 introduce the data and offer a descriptive analysis. Following a brief theoretical discussion, I will construct the probit model which is used to generate results in this paper. Section 5 presents estimates of probit models for the outcomes of labour force participation and employment that examine the effects of the expansion of the UCCB on women's labour supply behaviour. The final conclusions and corresponding suggestions are given in Section 6.

2. Background

For most Canadian parents with young children, non-parental child care expenses are quite an important financial issue which cannot be avoided during their daily life. The justification for the UCCB program is to help these Canadian families to balance work, family life and child care choices effectively. In order to define this problem, I will provide an overview of child care expenses by families in different provinces and look at how much these child care costs can be relieved by the original UCCB and the expanded UCCB as compared to two other major child care programs in Canada. Then, I will pay some attention to the recent labour supply behaviour of women and consider whether or not there exists a general correlation between childcare benefit policies and mothers' labour force behaviours.

2.1 Overview of child care expenses in Canada.

Many Canadian parents with young children, especially children aged under 6 years old, spend a proportion of total household expenses on child care rather than staying at home to take care of their children. At this point, financial support from child care benefits is especially important to those parents to relieve their financial pressure. Malanik (2015) prepared a detailed report about federal government spending on child care for the office of the Parliamentary Budget Officer, and finds that as of 2011, non-parental child care was the form of child care used most frequently among families with a child aged between 2 and 4 years old. As Figure 1 shows, the proportion of parents with children aged between 2 and 4 years old who choose child care is approximately 60%, and families reduce their utilization of child care as

their children grow up.[1]

Malanik (2015) also examines data from Statistics Canada on median monthly child care expenses for those using full-time care for each child. Parents living in Quebec need to pay about $152 per month for non-parental child care for each child, which is the lowest monthly child care cost in Canada. In contrast, the highest monthly payment ($677) is paid by Ontario families, when they use full-time child care for their child. Malanik (2015) further finds that total household spending on child care has increased every year since 2004. In 2013-2014, 5% of the average family's total household spending, or $5.7 billion, was devoted to child care.

2.2 Three Major Child Care Benefit Programs in Canada

A. Subsidized Daycare Program in Quebec

All provinces/territories subsidize eligible low-income families by replacing some or all of the parent fees in regulated child care. However, Quebec's most of the cost of regulated approach to funding child care costs is quite different from that of the other provinces (Beach and Friendly, 2005). In September 1997, the Quebec government introduced a subsidized daycare program for families with children under the age of 4 and extended full-time kindergarten to all children aged 5. This program offered a highly subsidized cost of $5 per day per child for families who used daycare services for their children. In September 2000, the government applied the low-fee policy to all children aged between 0 and 59 months, and made an effort to increase the number of subsidized spaces for child care services. On January 1, 2004, the cost paid by families for both subsidized childcare services for preschool children

[1] Figure 1 is a reproduction of Figure 2-1 of Malanik (2015), constructed using data from Statistics Canada, http://www.statcan.gc.ca/pub/89-652-x/2014005/c-g/desc/desc01-eng.htm

and those offered within public schools was raised to $7 rather than $5 per day per child, and increased to $7.30 on October 2014.

Recently, controversy resulted from a new proposal that sliding-scale daycare fees replace the subsidized universal fee of $7-a-day daycare in Quebec. This new fee for the child care program has been in effect since April 2015. It requires eligible parents to pay different fees for daycare depending on their annual income level. Families with a total income of less than $55,000 will continue to pay the basic daily of rate $7.30; the fee will climb as high as $20 per day per child for families whose total annual income is more than $150,000.

Using data from the period before the introduction of this new fee structure, some economic analyses of the Quebec policy have shown that subsidized day care has allowed more women to return to work and also provide a great push to economic growth. For example, Fortin et al. (2012) describe the trends in daycare services and female labour force participation in Quebec and Ontario from 1996 to 2010. The gross cost of subsidies to daycare grew gradually during this period in Quebec. By the end of 2011, the annual cost of subsidies had increased to $2.2 billion, which is about seven times higher than the amount spent in 1997. They also compare the attendance rate of children aged between 0 and 5 in Quebec, Ontario and the rest of the provinces of Canada in 1998 and 2008 respectively. The change in the attendance rate for daycare is most significant in Quebec; it rises from 16% in 1998 to 43% in 2008. In comparison, the attendance rate in Ontario and other provinces of Canada increased by 2 percent and 8 percent respectively over this period.

B. The Child Care Expense Deduction (CCED)

The CCED is an income tax deduction for all parents who pay for eligible child care expenses, including costs of daycare centres, day nursery schools, and caregivers such as day camps or overnight boarding schools which have a primary purpose of providing child care while the parents are working or studying. Eligible parents have been able to claim these expenses through the CCED since 1971. Currently, the maximum amount that can be claimed under the CCED each year is limited to no more than $7,000 per child under the age of 7 years at the end of the year, and $4,000 per child for children aged 7 to 16 years. For disabled dependent children of any age who qualify for the disability tax credit, the maximum amount that can be claimed is $10,000. However, the federal government proposes to increase the Child Care Expense Deduction limits by $1,000, effective the 2015 tax year. This brings them to $8,000 per child under age 7, $5,000 for each child aged 7 to 16, and $11,000 for children who are eligible for the Disability Tax Credit as well.

C. Universal Child Care Benefit (UCCB)

In July 2006, the federal government launched the Universal Child Care Benefit (UCCB) for the purpose of helping to cover Canadian residents' expenses for child care services. Initially, this program issued a taxable $100 monthly payment to eligible families with children under the age of 6 years old. According to Malanik (2015), "the UCCB program cost to the federal government was $1.8 billion in 2006-2007" (p. 5). This figure is estimated to increase to $2.7 billion in 2013-2014 (Malanik 2015, p.6). Malanik's report also points out that due to receiving the UCCB, the share of household spending on child care declined by 3 percentage points in 2013-14, from 47% in 2007-2008.

In October 2015, the government proposed to both increase and expand UCCB payments. This enhanced UCCB program increases the monthly payment to $160 for children aged between 0 and 5. In addition, it provides a $60 monthly payment for children aged between 6 and 17. In July 2015, approximately 4 million eligible households received UCCB payments including up to six months of benefits to cover the January to June 2015 period (Carrie, 2015). The main fiscal impact resulting from this enhanced UCCB is that the federal government expects to pay about $3.5 billion total net UCCB payment as of January 2015, and that this amount will increase by $ 3.2 billion in 2015-2016 tax year as long as all eligible families receive the UCCB (Malanik 2015).

As far as I can see, the structures of these three child care benefit programs (subsidized daycare in Quebec, the CCED, and the UCCB) have altered in recent years. As a result, the effects of these costly child care benefit programs may be of interest to policy analysts and economists. Many of them are particularly interested in how females will alter their labour supply behaviour when they receive these benefits. The expanded UCCB policy, as the most controversial of these three child care policies, has faced many questions from economists (e.g. Koebel and Schirle 2015; Findlay 2015). They believe that there may exist some correlations between child care benefit policies and females' labour supply behaviour. Before investigating in this correlation, it is useful to provide an overview of women's labour supply behaviours in recent years in the next subsection. Then I will combine the existed facts with some previous studies about the original UCCB policy and other empirical studies related to my research question in this paper.

2.3 Recent trends in female labour supply in Canada

As described above, the government of Canada has modified many details of its childcare benefit policies over the years. In order to determine the correlation between changes on childcare benefit policies and female labour force supply, I will investigate recent trends in women's labour supply from both the labour force participation and employment rate points of view.

A. Female Labour Force Participation

Fortin et al. (2012) try to measure the effects of Quebec's daycare program on women's labour supply, and in so doing they present some facts about recent female labour force participation. Quebec had the lowest women's labour force participation rate (63%) in 1996. By 2011, the labour force participation rate of women aged between 15 and 64 had climbed to 75%, the highest among the provinces of Canada. The national women's labour force participation rate was about 70% in 1996, about 7 percentage points higher than the rate in Quebec. However, this participation rate gap disappears in 2010. Moreover, Fortin et al. (2012) examine the labour force participation of women aged between 15 and 64 by age of youngest child at home in Quebec, Ontario, and Canada as well as the participation rates of women by age of youngest child and family type in Quebec between 1996 and 2008.

In general, women have higher labour force participation rates in 2008 than in 1996, regardless of the number of children they have, but the increases are especially large in Quebec. The change in the labour force participation rate for women with children aged between 6 and

15 years old is as high as 13.5 percentage points in Quebec. In addition, the authors find that in Quebec, women with children aged under 6 are more likely to participate in the labour market than women without children. In contrast, the national labour force participation rate of women with children under the age of 6 is 65.3% in 1996, rising to 70.9% in 2008; all these numbers are higher than those for women without children during the same time periods.

Fortin et al. (2012) especially focuse on women's labour supply performance in Quebec, where they find that women's labour force participation rates vary with their family structure as well as with the number of children. The data show that the labour force participation rate of mothers with children under age six increases more rapidly for single-parent than for two-parent families between 1996 and 2008, rising by about 22 percentage points. Less than half the single mothers with preschool-aged children participate in the labour market, which is about 19 percentage points less than married mothers with preschool-aged children in 1996. However, this gap in labour force participation rates between married and single mothers with children aged under 6 falls to about 8 percentage points in 2008. The data further indicate that the labour force participation rate is almost the same for both married and single mothers with older children in 1996 and in 2008. All of this information suggests that the labour supply behaviour of women is likely to be influenced by the low-fee daycare policy.

To provide a more recent view of women's labour supply behaviour, I retrieved 2014 data from Statistics Canada. As shown in Table 1, female participation rates in Quebec have continued to increase to 79.4% and 87.2% for mothers with children under the age of 6 and with older children respectively. There is a greater change in the participation rate between 2008 and 2014 for mothers with younger children - about 5 percentage points. Elsewhere in

Canada, compared to the data for 2008, the labour force participation rates of women with children of different ages does not change much.

B. Female Employment Rate

Morissette et al. (2015) review the development of full-time employment in Canada from 1976 to 2014. They find that 64.2 % of Canadian women aged 25 to 54 were employed full time as employees or self-employed in 2014, which is considerably higher than the female full-time employment rate in 1976 (38%). In contrast, the percentage of Canadian men aged 25 to 54 employed full time as employees or self- employed decreases by almost 8 percentage points during the 1976 to 2014 period, falling from 89.8% to 82%. However, the percentage of the population employed full time in their main job for both sexes increase slightly from 1976 to 2014.

Morissette et al. (2015) also compare the percentage of the population employed full time in their main job by age group and education level for both females and males in specific years. The results show that the percentage employed full-time of women aged 17 to 24 and 25 to 29 with no university degree deceases by about 6 percentage points between 2007 and 2014. There is a little change in the percentage employed full-time for women aged between 30 and 54 with no university degree, while there is a 5 percentage point increase for low-educated women aged 55 to 64 during the same time period. The percentage employed full-time displays a similar trend for women with a university degree.

To sum up the results above, I find that an increase in women's labour force participation

accompanied the development of the child care benefits in Canada. However, the behaviour of the full time employment rate of Canadian women between 2007 and 2014 is more interesting. The observed decrease in the percentage of young women employed in a full time jobs and the fairly constant percentage of women aged between 30 and 54 employed in a full time job might indicate that the original UCCB has a negative effect on women's labour supply. Because the original UCCB only provided financial support to mothers with young children aged under 6, the benefits might possibly induce young mothers to work less, but have no effect on the labour supply of women with children aged above 6. However, the expanded UCCB policy not only increases benefits for mothers with children under 6, but also provides monthly benefits for mothers with children aged between 6 and 18. Thus, I have a strong motivation to investigate whether or not mothers with children aged between 6 and 18 changed their labour supply behaviour when they learned that the expanded UCCB policy would come into effect in January 2015.

In the next section, I will review previous studies related to the original UCCB policy. In addition, I also review some other empirical studies about the effects of similar child care benefit programs on women's labour supply worldwide, because there are few existing studies about the original UCCB. Considering the methodology used in these studies will help us to find a favourable dataset and methods to predict the labour supply response of mothers with children aged between 6 and 18 to the expanded UCCB in Canada.

2.4 Review of empirical studies

Before the introduction of the UCCB, the subsidized daycare program in Quebec was one

of the most popular topics of research on child care benefits, and attracted the attention of economists for many years (e.g. Baker et al. 2008; Lefebvre et al. 2009; Fortin et al. 2012). Many economists believe that there is a negative correlation between this subsidized daycare program and female labour supply. This raises the question of whether other types of child care benefits such as the UCCB have similar effects. Thus in this literature review, I will first provide some results related to the subsidized daycare program in Quebec and its impact on women's labour supply. Then I will focus on some existing literature on the original UCCB and the economic issues related to the expanded UCCB policy. Due to the lack of existing empirical studies of the UCCB within Canada, I will also review studies of universal child care benefits in Spain and the U.S.

2.4.1 Canadian empirical studies

Baker et al. (2008) analyze the effects of the low-fee daycare program in Quebec using data from the National Longitudinal Survey of Children and Youth (NLSCY). They draw annual data from five waves of the survey (1994-95, 1996-97, 1998-99, 2000-01, and 2002-03). They estimate that the labour force participation of married women increased by 7.7% in Quebec after low-fee childcare has been introduced. They also find consistent and robust evidence of negative effects of the policy change on child outcomes, parenting, and parent outcomes. However, the authors are unable to determine whether their findings represent a short term adjustment to childcare, or a long-run negative impact.

Lefebvre et al. (2009) obtain similar results in their research. However, they utilize annual data from the Survey of Labour and Income Dynamics (SLID) between 1996 and 2004. They

estimate the both difference-in-differences (DD) and difference-in-difference-in-differences (DDD) models to measure the potential long-term or life-cycle effects of Quebec's universal childcare policy. They find that this policy has a positive pattern of effects on labour supply and domestic incomes.

Milligan and Stabile (2009) also use data from Survey of Labour and Income Dynamics (SLID), but focus on the effects of the expanded National Child Benefit Supplement (NCBS) in Manitoba between 1999 and 2005. They find that social assistance benefits have negative effects on labour supply, and these effects are bigger for low-education families.

Recently, Fortin et al. (2012) review the impacts of the Universal Low-Fee Childcare Program on female labour force participation, domestic income (GDP) and government budgets. They find that the low-fee child care has a significant positive effect on women's labour force participation, leading to about 3.8% (70,000) more women participating in the labour market, which results in about a 1.7% ($5 billion) increase in provincial domestic income (p. 20). As for the impact on government budgets, the authors find that the tax-transfer return to the federal and Quebec governments significantly exceeds its cost.

The data resources and methodology utilized in studies of the subsidized daycare program in Quebec also influenced research on the UCCB. Schirle (2013) studies the effect of the UCCB on individual labour market behaviour on both the intensive and extensive margins. She uses the simple labour-leisure theoretical model to predict that an income transfer policy such as the UCCB would probably induce individuals to leave the labour market. Then, she utilizes monthly data from the Canadian Labour Force Survey for 2003 to 2009 and applies a difference-in-differences estimator. The main results show that there is a significant negative

income effect, especially for mothers with a lower level of education. She find that mothers with children under the age of 6 preferred flexible working hours， job protection, and employment benefits. The magnitude of the UCCB's effect on lower-educated mothers is bigger than the effect on higher-educated mothers. The evidence does not suggest that the UCCB significantly affects the father's labour supply decision.

Since the expanded UCCB was been announced in October 2015, the question most talked about is whether it is necessary for the government to provide the UCCB to families with children between 6 and 18. For example, Zilio (2015) states that only 49% of overall benefits will be paid to parents with young children in daycare, while more than half of the benefit will be received by parents with older children who do not have any daycare costs during the 2015 tax year. Thus, women with older children have more ways to spend this monthly payment, although the government believes parents are able to spend this payment on what is best for their children. However, in this study I am interested in whether women with older children receiving child care benefits will make similar labour supply decisions to those of women with children under 6. To shed further light on this question, I will review several other studies of the universal child care benefits and female labour supply in Spain and U.S.

2.4.2 Related studies in other countries

In 2007, the government of Spain introduced a sizable unanticipated child benefit. Gonzalez (2013) examines the effects of this universal child benefit on fertility and maternal labour supply. In order to increase fertility in Spain, the government decided to provide a cash benefit to all women who gave birth to a new child after July 1st, 2002. For the purpose of the

study, the author takes advantage of a natural experiment and the main identification strategy is a regression discontinuity design (RDD) supplemented with difference-in-differences estimates, including calendar month of birth fixed effects. The data are collected from Vital Statistics, which include information on the date of birth of the child and weeks of gestation for all live births. In this study, the author finds that the child benefit induces an increase in fertility, and the magnitude of the estimated effects is sizeable: the annual number of births increases by 6% due to this policy. With respect to consumption and women's labour supply, the results indicate that the child benefit generates a negative effect on the use of formal day-care and lower weekly hours of day-care. The women who are paid this benefit chose to work significantly less after giving birth; however, this effect has worn off by the child's second birthday. The author attributes these changes in women's labour supply and expenditure to the income effects of the child benefits.

In the early 21st century, many studies have been published in the U.S. to the investigate effects of childcare subsidies on the labour supply decisions of families. Anderson and Levine (2000) and Blau (2003) review the sizable empirical literature that estimates the response of labour supply, especially for female, to childcare costs using U.S. data. Tekin (2007) and Blau and Hagy (1998) are examples of papers in this group; all of them find positive and large effects of childcare subsidies on female employment. In contrast, Blau and Currie (2007) conclude that the link between childcare prices and labour supply is weak.

Recently, Guner et al. (2013) further examine the effects of a more generous and universal childcare subsidy program in the U.S. They develop a life-cycle equilibrium model for heterogeneous single and married individuals to observe labour supply decisions of women at

extensive and intensive margins. More specifically, instead of an econometric study, Guner et al. (2013) create a GE (general equilibrium) model to examine the labour supply of married women. The results show that the participation rate of married females increases as the eligibility constraints are relaxed, but the labour supply of males reacts negatively to the expansion of subsidies. If the childcare subsidies are expanded by doubling the subsidy rate, the participation rate rises by about 4.3 percentage points. However, the overall effects on aggregate hours and output are not large.

The more important contribution of this paper is not only observing the relationship between changes in women's labour supply decisions and their education level, but also with women's skills and their child-bearing status. They treat women who attained only high school level as less-educated, and those who participate less in the labour market as less skilled (Guner et al. 2013, p. 1). They find that the labour supply of less educated women is more sensitive to changes in childcare subsidies than that of more highly educated women; in fact, the percentage changes in the participation rate monotonically decline as the level of education increases (Guner et al. 2013, p. 26). Moreover, labour force participation also decreases when married women with early childbearing are disproportionately less skilled. With respect to the effects on the gender wage gap, a more generous subsidy induces a higher gender gap for women with a low education level than for more highly educated women.

2.5 Summary

Through reviewing a number of studies related to child care benefits, I have found that the UCCB in Canada has become a very controversial topic, especially the expansion of benefits

to a wider range of families. Most studies use the difference-in-differences method to evaluate universal child care benefit policies and the relationship between these child care benefits and the labour supply behaviour of mothers with young children, in both Canada and internationally. However, there are very few studies that pay attention to the labour supply behaviour of mothers with children between 6 and 18 under the effects of universal child care benefits. Therefore the objective of this paper is to fill this gap in the literature by examining the short-term changes in the labour supply of mothers with children aged between 6 and 18, resulting from the extension of the UCCB in Canada.

3. Data and Methodology

3.1 Data Source

The monthly data come from Canadian Labour Force Survey (LFS) public microdata files, which are prepared by the Labour Statistics Division, Statistics Canada. In order to observe the effects of the expanded UCCB which become effective in January 2015, I collect data for the periods January 2014 to June 2014 and January 2015 to June 2015 from the LFS. However, the LFS public use microdata files do not indicate whether a family receives the UCCB, so I select eligible individuals using the criteria of the policy.

I select married women aged from 25 to 54 whose youngest child is aged between 6 and 18 as the treatment group.[2] As the first control group, I will choose married women in the same age range whose youngest child is under the age of 6 or aged between 18 and 24. One thing

[2] I imposed the lower and upper age restrictions basically following Schirle (2013), who included married women aged 25-49. However, I extend the age range to 24 to 54, because I am more interested in the impacts of expansion of the UCCB on women with older children

that must to be noticed about this control group is that women whose youngest child is under 6 years old might also have older children aged between 6 and 18. Thus, in order to obtain more precise results, I introduce another control group: childless married women aged between 24 and 54. This group of women never benefit from the UCCB, and thus may be a better control group.

The sample size of the LFS during the observed periods is 1,233,071, including all of the respondents. After I remove all men and unmarried women, and drop married women who are under 24 or older than 54 years old, the effective size of the sample used in this paper decreases to 212,375. The number of observations in first and second control groups is 75,026 and 91,944 respectively. The treatment group includes 66,376 married women whose youngest child is aged between 6 and 18. In addition, I construct subsamples defined by education level. I classify those who hold a college diploma, bachelor's degree, or a graduate degree as the high education group, while those without these qualifications are regarded as the low education group.

In restricting the sample using a woman's marital status, I am following the lead of Schirle (2013). I include women with married and common-law status, and exclude single women and women in same sex marriages for practical purposes. Otherwise, it may be hard to achieve general results because such women are more likely have different non-labour income and time constraints as compared to married and common-law women. On the other hand, I include older women in my sample than does Shirle (2013). In deciding how to expand the age range of the sample, I made a cross-tabulation of the age of youngest child and the age of married women over 54 years old during the periods observed. The results of this cross-tabulation

indicate that there are about 2,000 observations lost due to not including women over 54 years of age, which is not too many compared to the total sample size in my study. Hence, excluding married women over age 54 would probably have little effect on the results.

It should be noted that the LFS is based on a stratified multi-stage design and uses a rotating panel sample design. Each month about 1/6th of the LFS sampled dwellings are in their first month of the survey, 1/6th are in their second month of the survey, and so on. Thus, the monthly samples during my observation periods (January 2014 to June 2014 and January 2015 to June 2015) are not independent. I am unable to fix this problem by applying a clustering correction to the standard errors, because the public use microdata files of the LFS does not allow one to link the individuals across months. In the absence of such a connection, I will re-estimate the model using only two months (June 2014 and June 2015) to test the robustness of my results.

3.2 Descriptive Statistics

I present summary statistics for the complete sample including both the before and after periods in Table 2. Table 2 reveals differences in labour supply behaviour across different groups of mothers. The highest labour force participation rate and employment rate are observed for mothers with a higher level of education. The labour force participation rate of all mothers in the sample is about 82%, which is quite similar to the 2014 value for women's labour force participation rate I mentioned in Section 2. Notably, the actual hours worked at the 40th percentile was 23 for highly educated mothers and 0 for less educated mothers. Highly educated mothers and less educated mothers are entirely differentiated at the 45th percentile and the median, but the 75th percentile of hours worked is almost same for these two groups.

Less educated mothers tend to work the least, with an employment rate that is 18 percentage points lower than that of highly educated mothers.

Mothers with a lower education level are less likely to have children under age 5, while mothers with a high education are most likely to have young children at home (32% vs. 39%). With respect with to the level of education, I can see in Table 2 that 35% of higher educated mothers have a university degree (BA or above) and for less educated mothers, 68% graduated from high school.

The last column of Table 2 summarizes childless women's labour supply behaviour. It shows that 84% of childless women participated in the labour force, which is 2 percentage points higher than the average participation rate of all mothers, but still lower than the participation rate of highly educated mothers. Similarly, the employment rate of childless women lies between those of less educated and highly educated mothers. However, on average childless mothers spent more hours working. The average hours worked of childless women is about 26.4, which is higher than the average hours worked of mothers with a higher education level. The average hours worked of childless women are above those of highly educated mothers at the 40^{th} and 45^{th} percentiles, but are the same at the 75^{th} percentile as those of highly educated mothers. The distribution of education levels for childless women is very similar to that of all women; 37% of childless women attain a college education, which is the most common level of education for these women.

In Figure 2, I can see a big difference between the labour market behaviours of mothers with a low education level relative to those of mothers with a high education level, when plotted against the age of their youngest children. The less educated mothers'

employment rates are quite low, at 46 and 55%, when their youngest child is under the age of 3 or aged between 3 and 5 respectively. The employment rate for highly educated mothers whose youngest children is aged under 3 is much higher at 74%, and the rate is even higher at 78% for highly educated mothers with children aged between 3 and 5.

While the hours worked by highly educated mothers and less educated mothers increase substantially as children grow up, the average hours per week of less educated mothers whose child is under the age of 3 are quite low at 10.65 hours. Their average hours worked continue to increase until their children are 18 to 24 years of age, reaching approximately 24.31 hours per week. Furthermore, less educated mothers' employment profiles over the ages of their youngest children appear to be much steeper than the profiles of mothers with a high education level in Figure 2. Overall, it is important to note that the labour market experience of mothers differs greatly with their educational background.

In Figure 3, I examine the labour market activity of mothers with different levels of education when their children are aged 0-5 and 6-17, before and after the expanded UCCB came into effect in January 2015. First, I consider the labour force participation rates of less educated mothers. The participation rate of less educated mothers whose youngest child is aged 0-5 is quite low at 56% before and 57% after the introduction of the expanded UCCB. The participation rate of less educated mothers with older children between 6 and 17 remained constant at 76%. The participation rates increased after the expansion of the UCCB for highly educated mothers with children aged 0-5. These tiny increases in participation rates and employment rates for more highly educated mothers with younger and older children suggest that the participation rates and employment rates are not considerably affected by the expansion

of the UCCB.

For average hours worked in Figure 3, mothers with a high education level worked on average 6 more hours than less educated mothers regardless of the age of their children. When I compare the average hours worked before and after the expansion of the UCCB, I observe an increase in average hours worked by both less educated mothers and highly educated mothers regardless of the age of the youngest child. However, average hours worked increased only slightly, which makes it difficult to expect that the expanded UCCB has affected mother's labour supply at the intensive margin.

Overall, it is clear that the labour supply behaviour of less educated mothers and highly educated mothers is quite different. In some dimensions, such as overall participation rates and average hours worked, there are huge gaps between less educated mothers and highly educated mothers whose youngest child is under age 6. However, these gaps are smaller for mothers whose youngest child is aged between 6 and 17. When I narrow our focus to labour supply before and after the expanded UCCB came into effect, there appears to be an increasing trend in labour supply, although the changes are not very large.

4. Methodology and Model

To identify the effect of the expanded UCCB on newly eligible mothers, a difference-in-differences estimator is used to compare the labour market activity of mothers with children aged between 6 and 18 to that of married women in two control groups, before and after the change in the UCCB. In this section, I will provide a theoretical discussion of how women might change their labour supply behaviour in response to the new UCCB policy came into

effected. Then, I will construct an econometric model and provide an explanation of the type of model.

4.1 Theoretical Discussion

The expanded UCCB constitutes expected non-labour income for eligible mothers. In a static labour supply model, a demogrant like the UCCB would decrease women's labour supply due to a pure income effect, when leisure is treated as a normal good. Thus, I expect women who receive the expanded UCCB to have a strong motivation to reduce their hours of work; some of them may even choose to leave the labour market. Because of the great emphasis put on intertemporal substitution in labour supply, I will review this issue in a simple two-period household model with endogenous labour supply. Firstly, I assume that all observed mothers are rational, and they exploit all trade opportunities available in the economy. For the moment, I do not consider uncertainty and assume that the intertemporal utility function of the individuals can be expressed as follows:

$$\mathrm{U} = \log C_1 + b \log(1 - L_1) + \beta[\log C_2 + b \log(1 - L_2)] \ , \tag{1}$$

where L_1 and C_1 are the labour supply and consumption of the individual before the expansion of the UCCB; L_2 and C_2 are labour supply and consumption after the expansion of the UCCB in January 2015.

The individual maximizes utility subject to the following two period budget constraints:

$$C_1 + S = W_1 L_1 \ , \tag{2}$$

$$C_1 = W_2 L_2 + (1 + r)S \ . \tag{3}$$

I define S to be private saving in the first period and r the interest rate; W_1, W_2 are the

wages received by the individual in the first and second periods respectively. Combining the two constraints I get the following intertemporal budget constraint:

$$C_1 + \frac{C_2}{1+r} = W_1 L_1 + \frac{W_2 L_2}{1+r} \ . \tag{4}$$

Solving the maximization problem subject to the intertemporal budget constraint, I get the following first-order conditions:

$$\frac{bC_1}{1-L_1} = W_1 \ , \tag{5}$$

$$\beta \frac{bC_1}{(1-L_1)} = \frac{W_2}{1+r} \ , \tag{6}$$

$$C_2 = \beta(1+r)C_1 \ . \tag{7}$$

After combining (5) and (6) I obtain a new relationship between labour supply in the two periods as follows:

$$\frac{\frac{1}{1-L_1}}{\beta \frac{1}{1-L_2}} = \frac{W_1}{\frac{W_2}{1+r}} \ . \tag{8}$$

This is the Euler equation for leisure and labour supply; it determines the optimal allocation of labour supply between two consecutive periods. At the margin, the individual allocates time between two consecutive periods by equalizing the marginal rate of substitution between labour in the two periods and relative wage rates in the two periods. If the addition of a demogrant to one's budget raises an individual's reservation wage in the second period, then I have reason to believe that mothers who expect to benefit from the expanded UCCB after January 2015 will reduce their labour supply and purchase more leisure time due to pure income effects.

Furthermore, based on the results of Schirle (2013), I expect that less educated mother are more likely to reduce labour supply after the expansion of the UCCB. One possible reason for that is that women with different education levels may have different consumption preferences over market goods and leisure time. Regarding the lower labour force participation rate of less

educated mothers I mentioned in Section 2, the opportunity cost of leisure is lower for less-educated women, so they might spend more leisure time in more enjoyable unpaid household production. With this in mind, I may expect these differences to result in less educated mothers having stronger preferences for their nonmarket time relative to consumption than highly educated mothers.

4.2 Overview of Model

To investigate the effects of the expanded UCCB on married women's labour supply, I will apply the difference-in-differences method. Specifically, the estimating equation takes the form

$$\Pr(Y_{it} = 1) = F\left(\beta_0 + \beta_1 UCCB_{it} + \beta_2 Olderchild_{it} + \beta_3 Postyear_{it} + X_{it}\gamma + Z_{it}\delta\right), \quad (9)$$

where F(.) is a cumulative distribution function. Note that the dependent variable Y_{it} is either participation in the labour force, or an employment indicator for woman *i* at time *t*. It is a binary variable set to 1 if individual *i* participated in the labour force (or was employed) in month *t*, and 0 otherwise. Since Y_{it} is a binary variable, I will use a Probit model to carry out the analysis.[3] Because the coefficients of the explanatory variables are not what I care about, I interpret the marginal effects; i.e., how a change in an explanatory variable affects the probability of participating in labour market (or being employed).[4]

Following the difference-in-differences method, I create the dummy variable $Olderchild_{it}$, which equals 1 if the married woman's youngest child is aged between 6 and 17,

[3] Schirle (2013) applies both the probit and the linear probability model (LPM) to examine the effects of the UCCB on women's labour supply. However, Horace and Oaxaca (2006) state that the LPM will usually generate biased and inconsistent estimates. Thus, I finally use Probit models to do estimation.

[4] I present the Probit estimates of coefficient in the appendix.

and 0 otherwise. I also create a dummy variable called $Postyear_{it}$, which is equal to 1 if the married woman is observed after the expanded UCCB came into effect in January 2015. The dummy variable $UCCB_{it}$ is an interaction term between $Olderchild_{it}$ and $Postyear_{it}$, which equals 1 if the married woman's youngest child is aged between 6 and 17 and the woman is observed after the expanded UCCB came into effect.

Considering the explanatory variables included in our model, I will follow Schirle's (2013) specification as closely as possible, given the limitations imposed by the public use microdata files. I construct a vector X_{it} that contains the baseline set of control variables, including education dummies, dummies for age of youngest child, and dummies for the woman's age. I also capture time and province fixed effects in the vector Z by creating dummies for each month of the year, for each province in Canada, and for interactions between months and provinces. I should note that dummies for January and Newfoundland are excluded from the regression.

Using the variable *agyownkn* in the LFS,[5] I create three dummy variables for the age of the youngest child. They are *No Child* (equals 1 if the woman is childless), *Aged <3* (equals 1 if the youngest child is under age 3), and *Aged 3-5* (equals 1 if the youngest child is aged between 3 and 5). The reference group is women whose youngest child is aged between 18 and 24.

age_12 is the variable in the LFS that indicates which age group the respondents belong to. I created six dummy variables – *Aged 25-29*, *Aged 30-34*, *Aged 35-39*, *Aged 40-44*, and *Aged 45-49* – one each for the five-year groupings 25 to 29, 30 to 34, 35 to 39, 40 to 44, and 45 to 49; the reference group is 50 to 54 years old age.

[5] The definitions of the LFS variables can be found in Table A1 in the appendix.

Education is divided into six categories. In the LFS, the variable *educ90* contains seven classifications and indicates the highest level of education the respondents attained from 1990 to the present. The dummy variables included are *0 to 8 Years* (less than secondary school), *Some Secondary* (some secondary school), *Grade 11 to 13* (high school graduate), *Some Post-Secondary* (some post-secondary education), *College* (college education), *Bachelor's Degree* (bachelor's degree), and *Graduate Degree* (graduate degree). Among these variables, a college education is the reference because the number of observations is the largest in this group.

5. Results

In this section, first I will examine the marginal effects of the probit model for sample 1, which excludes childless women. Then, I will repeat the estimation for sample 2, in which childless women replace the women in sample 1 whose youngest child is aged under 6. In all cases estimation is carried out for less educated women and highly educated women separately. The reference individual in the model is a women with a college education level, aged 50-54 whose youngest child is aged older than 17, lives in Newfoundland and was observed in January. In the less educated subsample, the reference person is a woman with grade 11 to 13 education; in the highly educated subsample, the reference person is a woman with a college diploma.

5.1 Empirical Results for Labour Force Participation

The average marginal effects for labour force participation for all women and by education level for samples 1 and 2 are presented in Tables 3 and 4 respectively. In columns (1) and (2) in Tables 3 and 4, I can see that the marginal effects of the expanded UCCB for all women and

less educated women are not statistically significant, as I expected. However, it is statistically significant at the 10% level for highly educated women as shown in the last column in Tables 3 and 4; those woman who are observed after the UCCB expansion came into effect are about 0.7-0.8 percentage points less likely to participate in the labour force as shown in both Tables 3 and 4. The marginal effects in the remainder of Tables 3 and 4 represent the change in the predicted probability of labour force participation as each control variable changes.

The marginal effects in column (1) of Table 3 show that women are about 2.6 percentage points less likely to participate in the labour force if their youngest child is aged between 6 and 17. In comparison, women with younger children are much less likely to participate in the labour force; women whose youngest child is under age 3 or aged between 3 and 5 are 16 percentage points and 11 percentage points less likely to participate respectively. When I estimate using sample 2, I can see from column (1) of Table 3 that women with an older child are 3 percentage points less likely to participate in the labour force than those whose youngest child is 18-24, as are childless women. In addition, comparing columns (2) and (3) in both Tables 3 and 4, I find that less educated mothers are less likely to participate in the labour force than highly educated mothers, holding the age of the youngest child constant. All of the above average marginal effects are statistically significant at the 1% level.

With respect to age, I find that the probability of participating in the labour force tends to decrease as women get older. This phenomenon is most obvious in column (1) of Table 4. Women between the ages of 25 and 29 are the most likely to participate in the labour force, about 4.9 percentage points more likely than the reference group of women aged 50 to 54. The likelihood of participating in the labour force is only 4.4 percentage points higher for women

between the ages of 30 and 34, which is 0.6 percentage points higher than for women aged between 35 and 39. Furthermore, for women older than 40, the probability of participating in the labour force decreases sharply, with the average marginal effect decreasing from 3.4 percentage points for women aged between 40 and 44 to 1.9 percentage points for women aged between 45 and 49. However, column (1) of Table 3 implies that the effect of age on labour force participation is considerably smaller for mothers. It shows that the average marginal effects of the age variables are statistically significant at the 1% level for women in the age groups 30 to 34, 35 to 39, and 40 to 44 and are statistically significant at the 10% level for women in the 45 to 49 age group. There is no significant difference between young mothers aged 25 to 29 and those aged 50 to 54. Furthermore, comparing columns (2) and (3) of Table 3, I find that highly educated women have a much higher likelihood of labour force participation than less educated women in the age groups 25-29, 30-34, and 35-39, but the probabilities of labour force participation are more similar if the woman is older than 40. Columns (2) and (3) in both Tables 3 and 4 suggest that age matters more for women with a higher education level.

Looking again at column (1) of Tables 3 and 4, I find a similar pattern with respect to women's education levels in the two samples. Basically, those women with a higher education (some post-secondary degree, university with a BA degree, and graduate degree) are more likely to participating in the labour force as compared to those with grade school education or less. What is more, the average marginal effects are larger for sample 1. At the level of a bachelor's degree, women are 1.8 percentage points in Table 3 and 0.9 percentage points in Table 4 more likely to participate in the labour force in comparison to women with a college

diploma. Furthermore, the probability of participating increases by 4.6 percentage points and 3.1 percentage points as the level of education rises above the Bachelor's degree in Tables 3 and 4 respectively. In contrast, women with some postsecondary education in sample 1 are 8.4 percentage points less likely to participate in the labour force, which is 2 percentage points more in magnitude than women in sample 2. More specifically, women with 0-8 years of education are the least likely to participate in the labour force: 32 percentage points and 26 percentage points less likely than the reference group as shown in column (1) of Tables 3 and 4.

5.2 Empirical Results for Employment

Tables 5 and 6 show the average marginal effects on employment for all women and by education level for each sample. As I expected, I cannot find a statistically significant marginal effect of the UCCB for either full sample of women. The expansion of the UCCB reduces the probability of being employed by a very tiny amount (0.6 percentage points and 0.5 percentage points) as shown in column (1) of Tables 5 and 6. The average marginal effect of the UCCB is still not significant for less educated women in sample 1, as shown in column (2) of Table 5. However, the result in the last column of Table 5 is statistically significant at the 5% level, which suggests that women in sample 1 with a higher education level are 1 percentage point less likely to be employed since the UCCB has been expanded. In addition, in columns (2) and (3) of Table 6, I find the average marginal effects of the UCCB for less educated women and highly educated women are both statistically significant at the 5% level and the 1% level respectively. The most interesting finding is that women with a lower education level are 2.2

percentage points more likely to be employed; in contrast, married women with a higher education level are 1.5 percentage points less likely to be employed when they are observed after the UCCB came into effect. Furthermore, this result is almost consistent with Schirle's (2013) finding that the probability of being employed fell by 1.3 percentage points for highly educated married women who benefited from the original UCCB policy.

Comparing the average marginal effects of *Postyear* in column (1) of Tables 5 and 6, I find that they are statistically significant at the 1% level for all married women in both samples. This finding implies that all women in both samples are about 1% more likely to have been employed from January to June in 2015 than from January to June in 2014.

In column (1) of Table 5, I can see that married mothers in sample 1 whose youngest child is aged between 6 and 18 are 2.9 percentage points less likely to be employed than women whose youngest child is aged 18 and over. In comparison, women whose youngest child is aged under 6 years old are much less likely to be employed in the labour market. In particular, the probability of being employed decreases by 15 percentage points if the youngest child is under age 3. On the other hand, in column (1) of Table 6, I do not find a large difference between the average marginal effects of having a youngest child aged between 6 and 17 and being childless, both of which are statistically significant at the 1% level. The results imply that such women are about 3.3 percentage points less likely to be employed than women whose youngest child is aged 18 to 24. However, less educated mothers are less likely to be employed than less educated childless women as shown in column (2) of Table 6, but highly educated mothers whose youngest child is aged between 6 and 17 are slightly more likely to be employed than highly educated childless women, as shown in the last column of Table 6.

The estimated average marginal effects of age are not consistently significant for either education level as shown in Table 5 and Table 6. Consistent with our expectation that the likelihood of employment is decreasing in age relative to the reference group (age 50 to 54), the marginal effect of each age variable is positive and decreasing in magnitude with age for married women in column (1) of Table 6. However, the marginal effects of age in column (1) of Table 5 do not show the expected pattern. For married women aged between 25 and 29, the probability of being employed decreases by 1.7 percentage points as compared to the reference group. Similarly, married women aged between 30 and 34 are only 1.2 percentage points more likely to be employed than women in the reference group. The results further imply that holding other things constant, women aged between 35 and 39 are the most likely to be employed among all age groups, by about 2.7 percentage points more than women in the reference group.

Tables 5 and 6 also contain the estimated average marginal effect of each education level for married women in both samples. I expected that in the pooled samples, the average marginal effects for women at the some postsecondary education level or below should be negative relative to the reference group (college education), but they should be positive for women with university degree or above relative to the reference group, because the likelihood of employment should be increasing in years of education. Column (1) of Tables 5 and 6 shows that the estimated average marginal effects of education are exactly as I expected and are all statistically significant at the 1% level. The least educated women in both samples are the least likely to be employed. Their probability of employment is 36 percentage points and 30 percentage points less than that of the reference group, as shown in column (1) of Tables 5 and 6 respectively. In contrast, women with a Bachelor's degree or above are more likely to be

employed than the reference group. Specifically, the most educated women are 4.4 percentage points and 3.4 percentage points more likely to be employed than the reference group, which is the highest probability of being employed among all education groups.

5.3 Robustness Check

To verify the robustness of the results, I re-estimate the model to observe average marginal effects on likelihood of being employed for women in sample 2 using only two months of data (June 2014 and June 2015). The samples for these two months are independent and thus there is no need to be concerned about the standard errors. Then, I re-estimate the model using LFS weights to verify whether the choice of weights matters.[6]

Column (1) of Table 7 shows that the average marginal effect of *UCCB* on the likelihood of being employed for all women in sample 2 is still not statistically significant. Not surprisingly, however, the magnitude of the average marginal effect of *UCCB* for less educated women in sample 2, shown in column (2) of Table 7, becomes larger as compared to the results presented in column (2) of Table 6. This confirms the finding that women with a lower education level are more likely to being employed when they are observed after the expanded UCCB came into effect. This result is statistically significant at the 5% level.

In addition, column (3) of Table 7 shows that the average marginal effect of the *UCCB* becomes less significant than the result shown in column (3) of Table 6. Highly educated women are still less likely to be employed when they are observed after the expanded UCCB came into effect, but the effect is now significant at the 10% level, not the 5% level.

[6] The results using weights are presented in Table A6 in the appendix.

Most importantly, the estimated results shown in Table 7 with respect to age and education are fairly similar to the results in Table 6, except for the average marginal effects of some age variables for less educated women in column (2) of Table 7; they are no longer statistically significant when I re-estimate the model using only data for June 2014 and June 2015.

Finally, I re-estimate the model using the LFS weights as another robustness check for sample 2. I find that the estimated coefficient of *UCCB* changes somewhat in magnitude due to using weights. For example, the average marginal effect of *UCCB* for less educated women is now 1 percentage point larger than the average marginal effect shown in column (2) of Table 6. However, it is more statistically significant. For highly educated women, the magnitude of the coefficient of *UCCB* is smaller than the estimate shown in column (3) of Table 6, and significant at the 10% level, not the 1% level. The economic implications and signs of the coefficients of *UCCB* are identical to those of the unweighted estimates. Overall, using weights does not have any important effects on my results.

6. Conclusion

The purpose of this study is to explore the effects of the expansion of the UCCB on the labour supply of women with older children by examining the likelihood of participating in the labour force and being employed. The difference-in-differences estimator, the coefficient of *UCCB*, is the primary focus. I find that highly educated women with older children are less likely to participate in the labour market due to the expansion of the UCCB, and they are more sensitive to changes in the UCCB in the short-term. However, less educated women with older children are *more* likely to be employed. It is possible that they were affected by other factors

which dominated the negative marginal effects of the announcement of the expansion of the UCCB. However, this is not what I focus on in this study.

The estimation results also suggest that women with younger children (under the age of 6) are less likely to participate in the labour force or be employed, compared to childless women and women whose youngest child is aged between 6 and 17. Thus, a stronger case can be made for the provision of benefits to women with younger children (under the age of 6) than to childless women or women whose youngest child is aged between 6 and 17. Their labour supply might be greatly improved by the expansion of the UCCB. On the other hand, the changes in the likelihood of participating in the labour force and being employed are quite similar for childless women and women whose youngest child is aged between 6 and 17, which may imply that the labour supply decisions made by women with older children are less likely to be affected by the fact that they have children. Furthermore, there is a very low probability that they will purchase child care services for their children. This raises the question of whether it is necessary to provide a $60 monthly benefit to women whose youngest child is aged between 6 and 17.

Moreover, I should note that the expansion of the UCCB will be replaced with a new Canada Child Benefit (CCB) designed by the Liberal Party of Canada (2015),[7] as the Liberals won a majority in the 2015 federal election. Compared to the current child care benefits system, the CCB provides more support for low-income families and targets benefits towards the middle class.

For a typical two-parent middle class family with $90,000 in annual income, the CCB will

[7] For more details about the CCB, see Liberal Party of Canada (2015), https://www.liberal.ca/files/2015/05/Fairness-for-the-Middle-Class.pdf.

provide $2,500 more tax-free benefits than the current child benefits system. This increase in child benefits from the CCB might bring about an improvement in the future labour supply behaviour of women in the typical family whose youngest child is under the age of 6, because the evidence in my paper shows that those women are the least likely to participate in the labour force or be employed. These women may need the new CCB most and if they spent these benefits on child care for their child, their probability of participating in the labour force and being employed will increase.

As under the expanded UCCB, a middle class family with a child aged between 6 and 17 is also eligible to benefit from the CCB, and even receive more benefits than under the expanded UCCB policy. Again, given the finding that women whose youngest child is aged between 6 and 17 make labour supply decisions similar to those of childless women, I still have to question if it is necessary to provide even higher child benefits to women with older children. Is it more rational to provide child benefits to those women with older children, who are at a low income level?

For future research, I suggest using the master microdata files of the Labour Force Survey to construct more accurate samples. Furthermore, I recommend observing the effects of the expansion of the UCCB on women's labour supply for women with different income levels, because they might make different labour supply decisions when they are faced with the same amount of childcare benefits. Income level can also be considered as an independent variable in the model, but it may create an endogeneity problem, since income level might be correlated with both labour supply decisions and education. To resolve this kind of problem, IV estimation is recommended.

In conclusion, I find a significant negative marginal effect on the labour supply decisions of highly educated women whose youngest child is aged between 6 and 17. Due to data and knowledge limitations I am unable to provide more precise results from the model. However, this paper still can be considered a contribution to the literature on the UCCB.

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Tables

Table 1. Labour Force Participation Rate of Women Aged 15 to 64 by Age of Youngest Child at Home, Quebec, Ontario, and Canada in 2014

	Ontario	Quebec	Canada
Less than 6 years old	71.4%	79.4%	71.5%
6 to 15 years olds	83.1%	87.2%	83.6%

Source: Statistics Canada, Labour Force Survey, 2014. (CANSIM table 282-0211). Retrieved October, 2015.

Table 2. Descriptive Statistics (sample percentages)

	All Mothers	Low Education Mothers	High Education Mothers	Childless Women
In Labour Force	0.82	0.70	0.86	0.84
Employed	0.78	0.65	0.83	0.80
Hours				
Average	23.3	19.6	24.6	26.4
40th Percentile	20	0	23	28
45th Percentile	24	12	28	30
Median	29	20	30	32
75th Percentile	40	37.5	40	40
Percentage of Women Eligible for UCCB	0.22	0. 22	0.23	0
Youngest Kids				
Aged <3	0. 22	0. 18	0. 24	
Aged 3-5	0.15	0. 14	0.15	
Aged 6-12	0. 28	0. 26	0.29	
Aged 13-15	0.11	0. 12	0. 11	
Aged 18-24	0.14	0. 19	0. 13	
Women' Age				
Aged 25-29	0.09	0.11	0.07	0.17
Aged 30-34	0.17	0.16	0.17	0.13
Aged 35-39	0.21	0.18	0.22	0.08
Aged 40-44	0.22	0.18	0.22	0.09
Aged 45-49	0.19	0.19	0.18	0.17
Aged 50-54	0.14	0.17	0.13	0.36
Education				
0 to 8 Years	0.02	0.07		0.02
Some Secondary	0.07	0.25		0.07
Grade 11 to 13,Grad	0.2	0.68		0.22
Some Post-Secondary	0.06		0.09	0.05
College Diploma	0.4		0.56	0.37
University: Bachelor's Degree	0.18		0.26	0.19
University: Graduate Degree	0.07		0.09	0.08
N	141,402	33,457	107,945	70,973

Source: Author's tabulations from the Labour Force Survey.

Table 3. Estimated Average Marginal Effects for Married Mothers in Sample 1

	All Mothers	Less educated Mothers	Highly educated Mothers
	(1)	(2)	(3)
UCCB	-0.00650	-0.00159	-0.00769*
	(-1.63)	(-0.16)	(-1.80)
Postyear	0.0126***	0.0111*	0.0130***
	(4.85)	(1.71)	(4.69)
Youngest Kids			
Aged <3	-0.155***	-0.232***	-0.131***
	(-33.07)	(-21.96)	(-25.27)
Aged 3-5	-0.105***	-0.177***	-0.0809***
	(-22.81)	(-17.12)	(-15.74)
Olderchild	-0.0257***	-0.0384***	-0.0182***
	(-6.43)	(-4.38)	(-4.04)
Women' Age			
Aged 25-29	0.0000634	-0.0342***	0.0144**
	(0.01)	(-2.89)	(2.47)
Aged 30-34	0.0208***	-0.00238	0.0274***
	(4.48)	(-0.22)	(5.37)
Aged 35-39	0.0338***	0.00958	0.0394***
	(7.96)	(1.00)	(8.41)
Aged 40-44	0.0210***	0.0254***	0.0202***
	(5.31)	(2.79)	(4.67)
Aged 45-49	0.00722*	0.00610	0.00813**
	(1.92)	(0.72)	(1.97)
Education			
0 to 8 Years	-0.323***	-0.291***	
	(-46.29)	(-31.57)	
Some Secondary	-0.221***	-0.160***	
	(-54.51)	(-28.26)	
Grade 11 to 13	-0.0961***		
	(-35.47)		
Some Post-Secondary	-0.0847***		-0.0761***
	(-18.53)		(-18.54)
Bachelor's Degree	0.0186***		0.0165***
	(6.86)		(6.77)
Graduate Degree	0.0466***		0.0417***
	(11.55)		(11.48)
Average Predicted Probability	0.815***	0.691***	0.854***
	(825.24)	(288.80)	(808.16)
N	141, 402	33, 475	107, 927

Note: (1) *t* statistics in parentheses (2)* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (3) The reference individual in the model is women with college education level, aged 50-54 whose youngest child is aged older than 17, lived in Newfoundland and were observed in January.

Table 4. Estimated Average Marginal Effects for Married Women in Sample 2

	All Women	Less educated Women	Highly educated Women
	(1)	(2)	(3)
UCCB	-0.00138	0.0115	-0.00682*
	(-0.39)	(1.38)	(-1.82)
Postyear	0.00679***	-0.00376	0.0113***
	(2.98)	(-0.75)	(4.50)
Youngest Kids			
Olderchild	-0.0307***	-0.0479***	-0.0236***
	(-8.99)	(-6.26)	(-6.35)
No Child	-0.0253***	-0.0281***	-0.0271***
	(-8.89)	(-4.63)	(-8.52)
Women' Age			
Aged 25-29	0.0491***	0.00801	0.0604***
	(13.11)	(0.84)	(15.53)
Aged 30-34	0.0435***	0.0108	0.0548***
	(12.26)	(1.27)	(14.49)
Aged 35-39	0.0371***	0.0189**	0.0436***
	(11.70)	(2.57)	(12.84)
Aged 40-44	0.0339***	0.0299***	0.0352***
	(12.17)	(4.69)	(11.78)
Aged 45-49	0.0193***	0.0183***	0.0202***
	(7.95)	(3.42)	(7.62)
Education			
0 to 8 Years	-0.258***	-0.255***	
	(-45.44)	(-32.91)	
Some Secondary	-0.174***	-0.140***	
	(-54.36)	(-30.76)	
Grade 11 to 13	-0.0709***		
	(-30.78)		
Some Post-	-0.0640***		-0.0551***
Secondary	(-15.86)		(-15.87)
Bachelor's Degree	0.00927***		0.00677***
	(3.60)		(3.05)
Graduate Degree	0.0311***		0.0255***
	(8.19)		(7.80)
Average Predicted	0.851***	0.758***	0.887***
Probability	(974.91)	(380.95)	(950.56)
N	158, 320	44, 336	113, 984

Note: (1) *t* statistics in parentheses (2)* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (3) The reference individual in the model is women with college education level, aged 50-54 whose youngest child is aged older than 17, lived in Newfoundland and were observed in January.

Table 5. Estimated Average Marginal Effects for Married Mothers in Sample 1

	All Women	Less educated Mothers	Highly educated Mothers
	(1)	(2)	(3)
UCCB	-0.00643	0.00690	-0.0103**
	(-1.51)	(0.69)	(-2.22)
Postyear	0.0109***	0.0115*	0.0108***
	(3.88)	(1.71)	(3.56)
Youngest Kids			
Aged <3	-0.151***	-0.219***	-0.131***
	(-30.35)	(-19.98)	(-23.48)
Aged 3-5	-0.107***	-0.165***	-0.0859***
	(-21.79)	(-15.44)	(-15.55)
Olderchild	-0.0289***	-0.0436***	-0.0200***
	(-6.79)	(-4.85)	(-4.12)
Women' Age			
Aged 25-29	-0.0166***	-0.0642***	0.00317
	(-2.94)	(-5.22)	(0.50)
Aged 30-34	0.0125**	-0.0266**	0.0241***
	(2.54)	(-2.44)	(4.37)
Aged 35-39	0.0272***	-0.00433	0.0354***
	(6.05)	(-0.44)	(7.05)
Aged 40-44	0.0192***	0.0240***	0.0185***
	(4.60)	(2.58)	(3.98)
Aged 45-49	0.00913**	0.0115	0.00896**
	(2.29)	(1.33)	(2.01)
Education			
0 to 8 Years	-0.355***	-0.309***	
	(-45.27)	(-31.45)	
Some Secondary	-0.250***	-0.179***	
	(-56.38)	(-30.57)	
Grade 11 to 13	-0.104***		
	(-35.59)		
Some Post-	-0.0953***		-0.0875***
Secondary	(-19.39)		(-19.35)
Bachelor's Degree	0.0249***		0.0230***
	(8.64)		(8.63)
Graduate Degree	0.0442***		0.0410***
	(10.49)		(10.53)
Average Predicted	0.780***	0.646***	0.822***
Probability	(738.84)	(261.29)	(716.62)
N	141, 402	33, 475	107, 927

Note: (1) *t* statistics in parentheses (2)* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (3) The reference individual in the model is women with college education level, aged 50-54 whose youngest child is aged older than 17, lived in Newfoundland and were observed in January.

Table 6. Estimated Average Marginal Effects for Married Women in Sample 2

	All Women	Less educated Women	Highly educated Women
	(1)	(2)	(3)
UCCB	-0.00514	0.0215**	-0.0151***
	(-1.33)	(2.44)	(-3.59)
Postyear	0.00917***	-0.00521	0.0154***
	(3.67)	(-0.99)	(5.52)
Youngest Kids			
Olderchild	-0.0329***	-0.0542***	-0.0236***
	(-8.77)	(-6.69)	(-5.66)
No Child	-0.0339***	-0.0380***	-0.0350***
	(-10.84)	(-5.93)	(-9.81)
Women' Age			
Aged 25-29	0.0439***	-0.0136	0.0601***
	(10.89)	(-1.36)	(14.07)
Aged 30-34	0.0396***	-0.00942	0.0561***
	(10.29)	(-1.06)	(13.42)
Aged 35-39	0.0311***	0.00145	0.0416***
	(9.01)	(0.19)	(11.03)
Aged 40-44	0.0317***	0.0235***	0.0346***
	(10.40)	(3.49)	(10.36)
Aged 45-49	0.0210***	0.0223***	0.0214***
	(7.85)	(3.92)	(7.16)
Education			
0 to 8 Years	-0.301***	-0.285***	
	(-46.10)	(-33.78)	
Some Secondary	-0.204***	-0.157***	
	(-57.08)	(-32.69)	
Grade 11 to 13	-0.0806***		
	(-31.97)		
Some Post-	-0.0760***		-0.0672***
Secondary	(-17.17)		(-17.11)
Bachelor's Degree	0.0155***		0.0127***
	(5.56)		(5.10)
Graduate Degree	0.0340***		0.0289***
	(8.39)		(8.01)
Average Predicted	0.812***	0.708***	0.853***
Probability	(851.63)	(336.38)	(819.27)
N	158, 320	44, 336	113, 984

Note: (1) *t* statistics in parentheses (2)* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (3) The reference individual in the model is women with college education level, aged 50-54 whose youngest child is aged older than 17, lived in Newfoundland and were observed in January.

Table 7. Robustness Check: Average Marginal Effects, Sample 2, June Only

	All Women	Less educated Women	Highly educated Women
	(1)	(2)	(3)
UCCB	0.000229	0.0514**	-0.0177*
	(0.02)	(2.39)	(-1.74)
Postyear	0.00585	-0.0126	0.0142**
	(0.96)	(-0.98)	(2.09)
Youngest Kids			
Olderchild	-0.0322***	-0.0727***	-0.0165*
	(-3.57)	(-3.68)	(-1.65)
No Child	-0.0274***	-0.0469***	-0.0230***
	(-3.64)	(-2.99)	(-2.69)
Women' Age			
Aged 25-29	0.0489***	-0.0366	0.0722***
	(4.93)	(-1.50)	(6.82)
Aged 30-34	0.0315***	-0.0189	0.0501***
	(3.41)	(-0.89)	(4.99)
Aged 35-39	0.0374***	0.0106	0.0472***
	(4.48)	(0.56)	(5.21)
Aged 40-44	0.0355***	0.00853	0.0453***
	(4.78)	(0.51)	(5.60)
Aged 45-49	0.0261***	0.00945	0.0338***
	(4.00)	(0.68)	(4.65)
Education			
0 to 8 Years	-0.284***	-0.272***	
	(-17.51)	(-12.94)	
Some Secondary	-0.191***	-0.152***	
	(-21.54)	(-12.69)	
Grade 11 to 13	-0.0737***		
	(-12.06)		
Some Post-Secondary	-0.0559***		-0.0494***
	(-5.02)		(-4.99)
Bachelor's Degree	0.0189***		0.0149**
	(2.81)		(2.49)
Graduate Degree	0.0411***		0.0345***
	(4.15)		(3.92)
Average Predicted Probability	0.818***	0.717***	0.856***
	(352.69)	(139.42)	(338.84)
N	26, 300	7, 283	19, 017

Note: (1) *t* statistics in parentheses (2)* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (3) The reference individual in the model is women with college education level, aged 50-54 whose youngest child is aged older than 17, lived in Newfoundland and were observed in January.

Figures

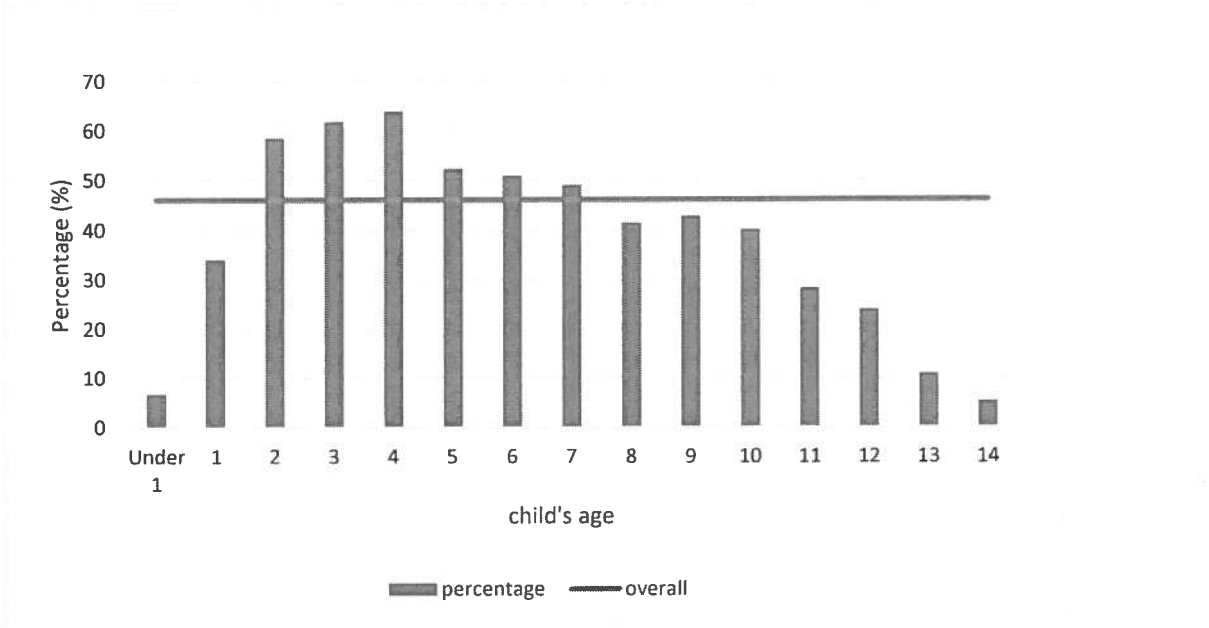
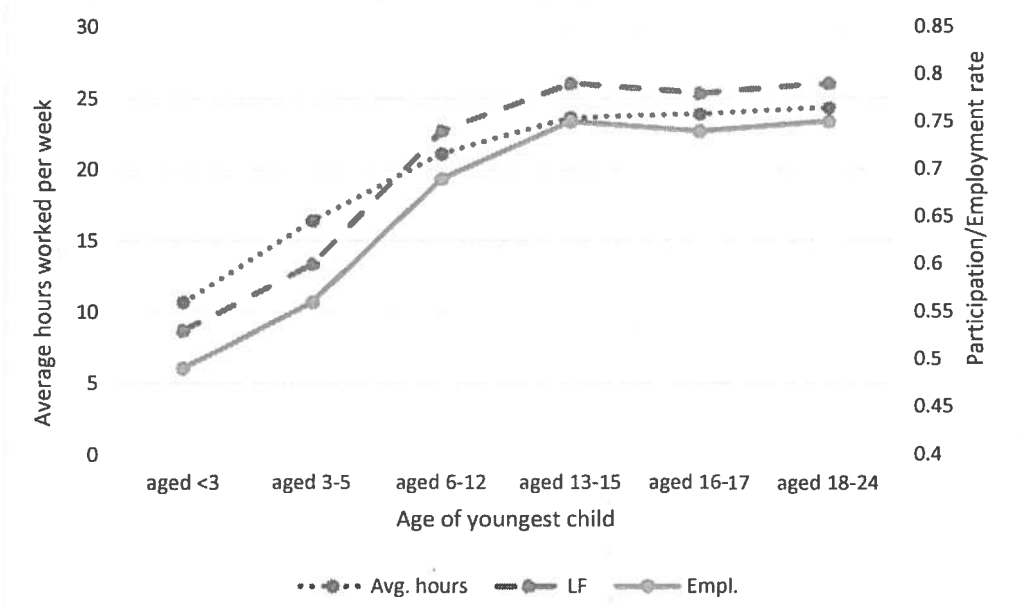
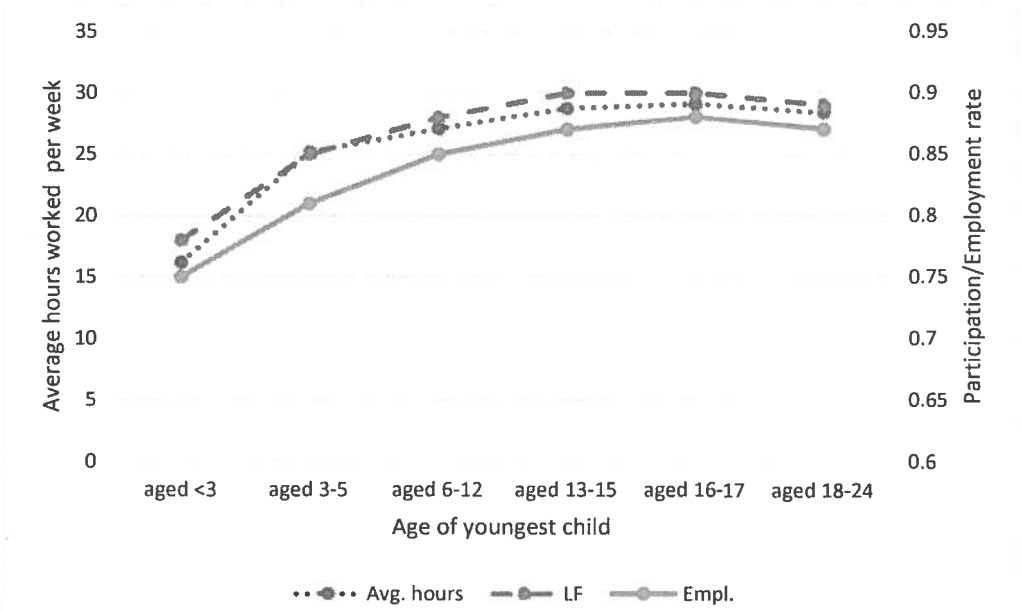


Figure 1. Proportion of families that use child care

Source: Figure 2-1 of Malanik (2015). The original data are from the 2011 General Social Survey by Statistics Canada.



A. Less educated mothers



B. Highly educated mothers

Figure 2. Labour Market Activity of Mothers with Different Education Levels, Age 25-54

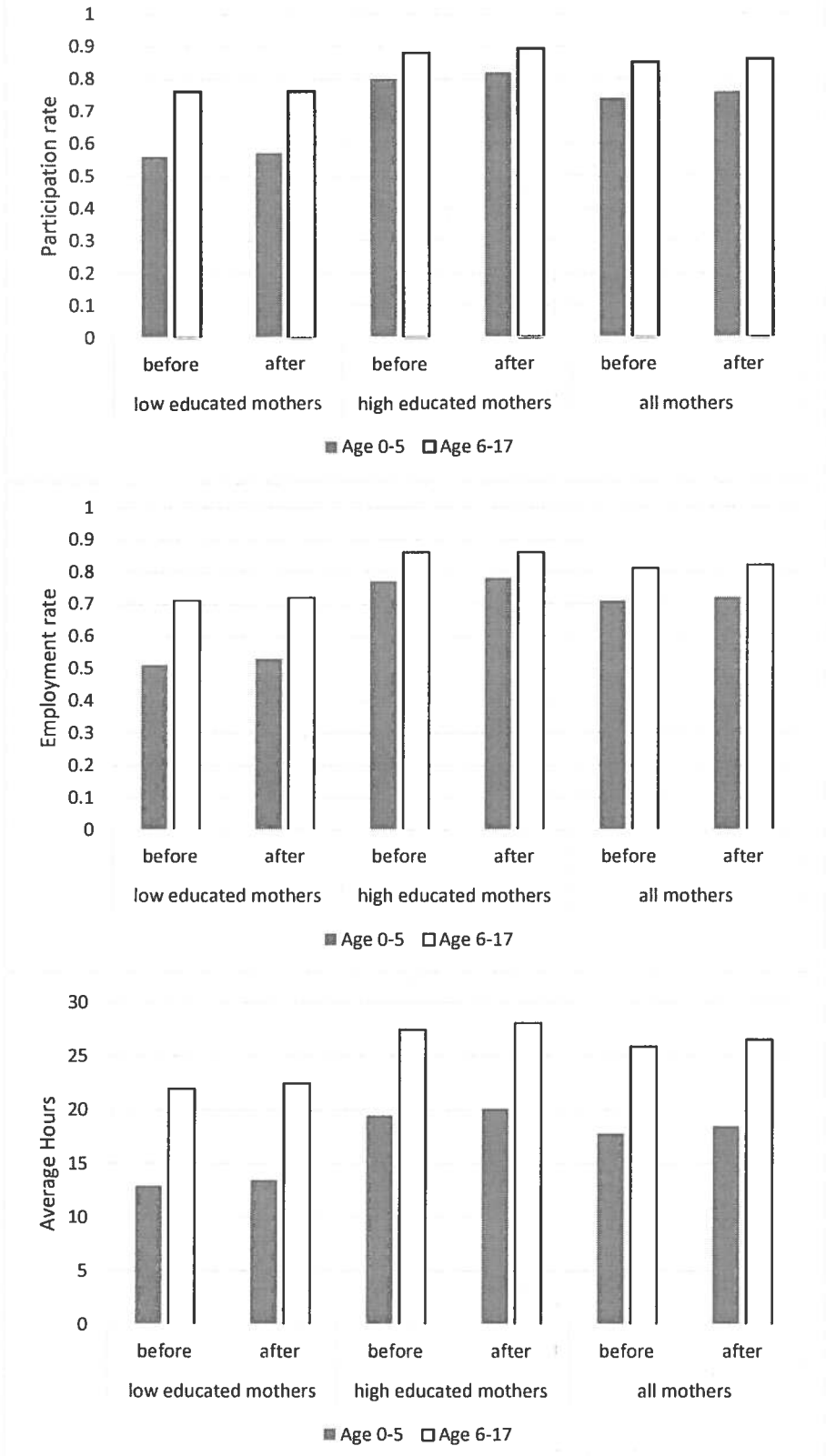


Figure 3. Labour Market Activity of Mothers, Age 25-54 Before and After UCCB Expansion.

Appendix

Table A1. Variable Definitions

Variable Name	**Variable Description**
survyear	survey year
survmnth	survey month
lfsstat	labour force status
agyownkn	age of youngest own child
age_12	age of respondent (5 year age groups)
educ90	highest education attained (1990 to present)
prov	province

Table A2. Estimated Results of Probit Model for Married Mothers in Sample 1

	All Mothers	Less educated Mothers	Highly educated Mothers
	(1)	(2)	(3)
UCCB	-0.0265	-0.00493	-0.0349*
	(-1.63)	(-0.16)	(-1.80)
Postyear	0.0516***	0.0344*	0.0590***
	(4.85)	(1.71)	(4.69)
Youngest Kids			
Aged <3	-0.631***	-0.721***	-0.596***
	(-32.85)	(-21.54)	(-25.20)
Aged 3-5	-0.430***	-0.551***	-0.368***
	(-22.75)	(-16.93)	(-15.72)
Olderchild	-0.105***	-0.119***	-0.0827***
	(-6.43)	(-4.38)	(-4.04)
Women' Age			
Aged 25-29	0.000259	-0.106***	0.0656**
	(0.01)	(-2.88)	(2.47)
Aged 30-34	0.0847***	-0.00739	0.124***
	(4.48)	(-0.22)	(5.37)
Aged 35-39	0.138***	0.0298	0.179***
	(7.96)	(1.00)	(8.41)
Aged 40-44	0.0856***	0.0789***	0.0917***
	(5.31)	(2.79)	(4.67)
Aged 45-49	0.0295*	0.0190	0.0369**
	(1.92)	(0.72)	(1.97)
Education			
0 to 8 Years	-1.316***	-0.905***	
	(-45.41)	(-30.29)	
Some Secondary	-0.902***	-0.496***	
	(-53.25)	(-27.37)	
Grade 11 to 13	-0.392***		
	(-35.18)		
Some Post-	-0.346***		-0.346***
Secondary	(-18.49)		(-18.49)
Bachelor's Degree	0.0759***		0.0751***
	(6.86)		(6.77)
Graduate Degree	0.190***		0.189***
	(11.54)		(11.47)
Constant	1.155***	0.770***	1.130***
	(21.92)	(8.00)	(17.94)
N	141, 402	33, 475	107, 927

Note: (1) *t* statistics in parentheses (2)* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (3) The reference individual in the model is women with college education level, aged 50-54 whose youngest child is aged older than 17, lived in Newfoundland and were observed in January.

Table A3. Estimated Results of Probit Model for Married Women in Sample 2

	All Women	Less educated Women	Highly educated Women
	(1)	(2)	(3)
UCCB	-0.00626	0.0383	-0.0361*
	(-0.39)	(1.38)	(-1.82)
Postyear	0.0308***	-0.0125	0.0597***
	(2.98)	(-0.75)	(4.50)
Youngest Kids			
Olderchild	-0.139***	-0.160***	-0.125***
	(-8.99)	(-6.26)	(-6.35)
No Child	-0.115***	-0.0937***	-0.144***
	(-8.89)	(-4.63)	(-8.52)
Women' Age			
Aged 25-29	0.223***	0.0267	0.320***
	(13.10)	(0.84)	(15.53)
Aged 30-34	0.198***	0.0359	0.290***
	(12.25)	(1.27)	(14.50)
Aged 35-39	0.169***	0.0629**	0.231***
	(11.69)	(2.57)	(12.84)
Aged 40-44	0.154***	0.0997***	0.186***
	(12.16)	(4.69)	(11.78)
Aged 45-49	0.0877***	0.0611***	0.107***
	(7.94)	(3.42)	(7.62)
Education			
0 to 8 Years	-1.169***	-0.849***	
	(-44.84)	(-31.87)	
Some Secondary	-0.790***	-0.466***	
	(-53.52)	(-29.97)	
Grade 11 to 13	-0.322***		
	(-30.68)		
Some Post-	-0.291***		-0.292***
Secondary	(-15.84)		(-15.87)
Bachelor's Degree	0.0421***		0.0359***
	(3.60)		(3.05)
Graduate Degree	0.141***		0.135***
	(8.19)		(7.80)
Constant	1.085***	0.783***	1.069***
	(23.17)	(10.29)	(18.04)
N	158, 320	44, 336	113, 984

Note: (1) t statistics in parentheses (2)* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (3) The reference individual in the model is women with college education level, aged 50-54 whose youngest child is aged older than 17, lived in Newfoundland and were observed in January.

Table A4. Estimated Results of Probit Model for Married Mothers in Sample 1

	All Mothers	Less educated Mothers	Highly educated Mothers
	(1)	(2)	(3)
UCCB	-0.0235	0.0203	-0.0407**
	(-1.51)	(0.69)	(-2.22)
Postyear	0.0398***	0.0340*	0.0429***
	(3.88)	(1.71)	(3.56)
Youngest Kids			
Aged <3	-0.552***	-0.643***	-0.520***
	(-30.14)	(-19.64)	(-23.38)
Aged 3-5	-0.390***	-0.486***	-0.341***
	(-21.71)	(-15.29)	(-15.53)
Olderchild	-0.105***	-0.128***	-0.0791***
	(-6.79)	(-4.85)	(-4.12)
Women' Age			
Aged 25-29	-0.0607***	-0.189***	0.0126
	(-2.94)	(-5.22)	(0.50)
Aged 30-34	0.0457**	-0.0781**	0.0953***
	(2.54)	(-2.44)	(4.37)
Aged 35-39	0.0992***	-0.0127	0.140***
	(6.05)	(-0.44)	(7.04)
Aged 40-44	0.0702***	0.0707**	0.0733***
	(4.60)	(2.58)	(3.98)
Aged 45-49	0.0333**	0.0339	0.0355**
	(2.29)	(1.33)	(2.01)
Education			
0 to 8 Years	-1.295***	-0.908***	
	(-44.39)	(-30.17)	
Some Secondary	-0.914***	-0.526***	
	(-54.79)	(-29.40)	
Grade 11 to 13	-0.378***		
	(-35.24)		
Some Post-	-0.348***		-0.347***
Secondary	(-19.33)		(-19.28)
Bachelor's Degree	0.0909***		0.0910***
	(8.64)		(8.63)
Graduate Degree	0.161***		0.162***
	(10.48)		(10.52)
Constant	0.920***	0.461***	0.901***
	(28.07)	(4.92)	(15.51)
N	141, 402	33, 475	107, 927

Note: (1) *t* statistics in parentheses (2)* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (3) The reference individual in the model is women with college education level, aged 50-54 whose youngest child is aged older than 17, lived in Newfoundland and were observed in January.

Table A5. Estimated Results of Probit Model for Married Women in Sample 2

	All Women	Less educated Women	Highly educated Women
	(1)	(2)	(3)
UCCB	-0.0201	0.0653**	-0.0665***
	(-1.33)	(2.44)	(-3.59)
Postyear	0.0359***	-0.0159	0.0681***
	(3.67)	(-0.99)	(5.52)
Youngest Kids			
Olderchild	-0.129***	-0.165***	-0.104***
	(-8.76)	(-6.69)	(-5.66)
No Child	-0.133***	-0.116***	-0.155***
	(-10.83)	(-5.92)	(-9.81)
Women' Age			
Aged 25-29	0.172***	-0.0414	0.265***
	(10.89)	(-1.36)	(14.05)
Aged 30-34	0.155***	-0.0287	0.248***
	(10.29)	(-1.06)	(13.41)
Aged 35-39	0.122***	0.00441	0.184***
	(9.00)	(0.19)	(11.02)
Aged 40-44	0.124***	0.0715***	0.153***
	(10.40)	(3.49)	(10.36)
Aged 45-49	0.0823***	0.0677***	0.0947***
	(7.84)	(3.92)	(7.16)
Education			
0 to 8 Years	-1.180***	-0.867***	
	(-45.34)	(-32.58)	
Some Secondary	-0.798***	-0.479***	
	(-55.77)	(-31.64)	
Grade 11 to 13	-0.316***		
	(-31.78)		
Some Post-	-0.298***		-0.297***
Secondary	(-17.14)		(-17.07)
Bachelor's Degree	0.0607***		0.0560***
	(5.56)		(5.10)
Graduate Degree	0.133***		0.127***
	(8.38)		(8.01)
Constant	0.836***	0.494***	0.842***
	(19.22)	(6.71)	(15.56)
N	158, 320	44, 336	113, 984

Note: (1) *t* statistics in parentheses (2)* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (3) The reference individual in the model is women with college education level, aged 50-54 whose youngest child is aged older than 17, lived in Newfoundland and were observed in January.

Table A6. Robustness Check using Weights: Average Marginal Effects, Sample 2

	All Women	Less educated Women	Highly educated Women
	(1)	(2)	(3)
UCCB	0.000284	0.0326***	-0.00998*
	(0.05)	(2.69)	(-1.71)
Postyear	0.00447	-0.00829	0.00968**
	(1.30)	(-1.14)	(2.47)
Youngest Kids			
Olderchild	-0.0439***	-0.0538***	-0.0405***
	(-8.60)	(-4.95)	(-6.99)
No Child	-0.0295***	-0.0312***	-0.0322***
	(-6.87)	(-3.54)	(-6.47)
Women' Age			
Aged 25-29	0.0478***	0.00307	0.0597***
	(8.64)	(0.23)	(10.02)
Aged 30-34	0.0480***	0.00972	0.0597***
	(8.94)	(0.80)	(10.01)
Aged 35-39	0.0363***	-0.00345	0.0494***
	(7.68)	(-0.32)	(9.47)
Aged 40-44	0.0258***	0.00950	0.0327***
	(6.14)	(1.01)	(7.09)
Aged 45-49	0.0209***	0.00712	0.0275***
	(5.67)	(0.91)	(6.62)
Education			
0 to 8 Years	-0.296***	-0.271***	
	(-32.37)	(-23.13)	
Some Secondary	-0.210***	-0.157***	
	(-41.83)	(-23.53)	
Grade 11 to 13	-0.0864***		
	(-24.66)		
Some Post-	-0.0711***		-0.0637***
Secondary	(-11.82)		(-11.73)
Bachelor's Degree	0.00159		0.000921
	(0.42)		(0.27)
Graduate Degree	0.0143***		0.0120**
	(2.66)		(2.45)
Average Predicted	0.808***	0.701***	0.845***
Probability	(615.04)	(241.15)	(581.90)
N	158,320	44,336	113,984

Note: (1) *t* statistics in parentheses (2)* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (3) The reference individual in the model is women with college education level, aged 50-54 whose youngest child is aged older than 17, lived in Newfoundland and were observed in January.