

**THE INCENTIVE EFFECTS OF THE ONTARIO
CHILD CARE SUPPLEMENT FOR WORKING
FAMILIES ON HOUSEHOLD LABOUR SUPPLY
DECISIONS**

by

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B.A., University of Western Ontario, 2004

PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF ARTS

In the
Department of
Economics

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SIMON FRASER UNIVERSITY

Fall 2005

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Abstract

This paper examines the efficacy of the Ontario Child Care Supplement for working families on the labour supply decisions of single parents with children. The empirical methodology consists of a difference-in-differences estimation strategy using Canadian Census data for 1996 and 2001. Findings show that the supplement provides labour market incentives for households on the intensive margin. That is, for households at work, findings show that substitution effects dominate income effects on weeks worked. An additional \$1,000 in benefits results in an increase of approximately two to three working weeks.

Acknowledgements

I offer sincere thanks to the faculty and my fellow students at the SFU Department of Economics. I owe particular thanks to Dr. Jane Friesen for her valuable guidance, encouragement, and support throughout my educational years. Special thanks are also owed to Steeve Mongrain and Brian Krauth for their valuable insights over the course of my project.

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Section I. Introduction

Past traditional income support attempts to alleviate poverty by using welfare programs, Earned-Income Supplements, Working Income Supplements and universal Child Tax Credits in Canada, as well as the various Negative Income Tax structures in the United States, have been recognized for their unfavourable incentive effects. Literatures on the above, along with many more programs, have highlighted the incidence of a 'welfare trap', where the reduction of benefits as income increases induces a high implicit tax rate on additional earnings. This effectively discourages the incentive for additional work. The reduction of benefits as income increases is referred to as a clawback. Many developed countries with income support programs have had clawback rates of 100 percent or more. Consequently, policy design with the objective of providing an adequate social safety net, while promoting economic self-sufficiency for an income support program, has been struggled with for decades.

Recent policy design favours in-work benefits or earned income tax credits, for example: the National Child Benefit (NCB) program in Canada; the Earned Income Tax Credit (EITC) in the United States; and the Family Credit (FC) and Working Families Tax Credit (WFTC) in the UK.¹ The motivation behind these programs is to avoid the creation of adverse work incentive effects. The effectiveness of such programs will be further discussed in the literature review.

¹ Blundel. 2000 provides a review on the EITC, WC, and WFTC reforms.

This paper uses a difference-in-differences estimation strategy to exploit a change in Ontario's 1998 NCB program. Specifically, it examines the incentive effects of the Ontario Child Care Supplement (OCCS) for Working Families with respect to single parent household labour supply decisions.

The objective of the OCCS is to provide social assistance to low-income households with children while encouraging labour force participation. Eligibility for the supplement, in addition to marital status, requires that a recipient be a resident of Ontario, receive the federal Canada Child Tax Benefit, have a child under the age of seven, and have the minimum income requirements.² The eligibility requirement of having a child under the age of seven is due to the prevalence of childcare costs being negatively correlated with labour force participation among households with preschool aged children.

The goal of this paper is to compare the labour supply decisions of single parents entitled to receive the OCCS to those who do not meet the eligibility requirements. Households that qualify and those that do not meet the eligibility criteria are defined as the "treatment" and "control" groups, respectively.³

Findings on the efficacy of the OCCS reform suggest positive incentive effects for labour supply outcomes on the intensive margin. Obtained results show that an additional \$1,000 in benefits, increases weeks worked for single parents with young children by approximately two to three weeks. Results on hours worked show that substitution and income effects neutralize each other.

² The supplement will be based on the greater of, qualifying income or qualifying childcare expenses.

³ The treatment and control groups take on varying definitions for the given identification strategies.

This paper is organized as follows: A literature review pertaining to labour supply decisions with respect to the effects of childcare costs, childcare subsidies, and in-work benefits is presented in Section II. Section III describes the Ontario Child Care Supplement in detail. Section IV presents the estimation strategy. Section V describes data. Section VI presents estimated results, followed by a discussion in Section VII. Finally, concluding remarks will be presented in section VIII.

Section II. Literature Review

The following papers have addressed the impact of childcare costs on labour supply decisions with a general consensus that there exists a negative correlation between childcare costs and the decision to enter the workforce. The magnitude of the correlation, however, lacks a consensus.

In the context of the U.S., Blau and Robins (1988) specify and estimate a model of family labour supply including both market and non-market childcare. Features of the model include the requirement of continued care for a young child, coupled with the presence of a second potential childcare provider other than the mother. Since family labour supply decisions are examined, it is assumed that the husband may serve as this second childcare provider. The authors further assume that every household has access to some informal source of childcare at zero or significantly low costs. Informal sources of childcare providers are defined to include teenagers, other relatives or friends. The authors define the term *other* as a potential childcare giver, including the husband and the informal source.

Therefore, there exist three possible forms of childcare: the mother, the informal source (including the husband), and the market. Households maximize utility with respect to the mother's leisure, others' leisure, quality of care purchased, and childcare time provided by the informal source. The latter being subject to time, quality, and budget constraints. The solution to the model yields five possible mutually exclusive states of the world as listed below.

- (0) The mother does not work and will not require childcare.
- (1) The mother works, no childcare is purchased, and the other provides child care in addition to working.
- (2) The mother works, no childcare is purchased, and the other only provides childcare.
- (3) The mother works, all non-motherly childcare is purchased in the market, and the other works.
- (4) The mother works, childcare is provided by the market and the other, where the other does not work.

Implications of the model yield the following unambiguous results: an increase in the price of child care increases the likelihood of states (0, 1, 2) where childcare is not purchased in the market, relative to states where child care is purchased; an increase in the wage increases the likelihood that the mother will work; an increase in exogenous income decreases the likelihood that the mother will work.

Data from the Employment Opportunity Pilot Project, which includes observations of approximately 30 000 households on family labour supply, childcare expenditures, and an extensive set of other relevant variables, was used to estimate the model. For the empirical analysis, a subsample of 6170 observations for married women under the age of 45 with a spouse and a child under the age of 14 were considered. Estimates were obtained via maximum likelihood logit estimates using wage rates for the mother and other, and the price per hour of market childcare as key explanatory variables.

The results obtained by the authors are consistent with the theoretical implications of the model. Specifically, the coefficient of childcare costs are statistically significant where an increase in childcare costs increases the probability that the mother does not work, relative to when the mother works and purchases childcare in the market. A higher wage was also found to be statistically significant with increasing labour force participation. This effect was strongest for states 3 and 4. However, despite the expected

negative correlation between an increase in exogenous income and the probability that the mother would work, neither of the coefficients was statistically significant at the 10% level.

The estimates also allowed the authors to calculate the average price elasticity of employment and the average price elasticity of purchased childcare as -0.38 and -0.34, respectively. These estimates were calculated over a range of \$0 to \$40 per week on childcare expenditures.

One caveat requiring mention is that Blau and Robins classified households as purchasing market childcare (states 3 and 4 if households reported direct child care expenditures *or* if childcare was reported to be given by a non-relative, day care centre, or group facility) even if direct expenditures were reported to be zero. Classifying a household as purchasing childcare when it is provided by a daycare at zero costs suggests that such estimates are likely to be biased.

Studies examining the impact of childcare costs on labour supply decisions of women, using Canadian evidence, include Cleveland, Gunderson and Hyatt (1996), and Powell (1997). Cleveland, Gunderson and Hyatt examine the joint decision of employment and mode of childcare for women with pre-school aged children using data from the 1988 Canadian National Child Care Survey (CNCC). The data set includes detailed information on labour market activity, childcare usage and many other family characteristics.

These authors, among many others, emphasize that the decision to engage in the labour force is determined not only by usual deterministic factors such as exogenous income and wages, but also by the cost of childcare arrangements. Furthermore,

childcare arrangements are also not only determined by the price of childcare, but also by the expected wage of the mother. Therefore, Cleveland, Gunderson and Hyatt estimate bivariate probits on the probability that a mother participates in the labour force and the probability that market forms of childcare are purchased.

Since the authors were considering the joint labour force participation and childcare choice decision for mothers having children of pre-school age, data from the CNCC was limited to families with children of age five and younger not attending school. Mothers who were single, self-employed, enrolled in school, permanently unable to work, or who had a spouse permanently unable to work were excluded from the analysis. The analysis also focused on the province of Ontario, resulting in a sample size of 1149 mothers, of which 56.5 % reported labour force work during the time of the survey.

Although hourly wage, labor income, and hours of work data were not collected by the CNCC for the same reference period, expected wages were calculated from a sample selection corrected regression. Variables such as age, education, and other characteristics were used to form unbiased estimates for annual wages of the mothers used in the sample.

Estimated results confirm the negative correlation between childcare costs on the labour supply of women with children and on the decision to purchase market childcare services. Specifically, a 10% increase in expected childcare costs results in a 3.9 % decrease of a mother's probability of participating in labour market work, and an 11 % decrease associated with the probability of purchasing market child care services. Furthermore, a 10 % increase in the mother's wage increases the probability of her

participation in labour market activity by 8.1 %, and increases the probability of purchasing market childcare services by 2 %. The elasticity of employment with respect to the cost of market childcare is reported as -0.388. The authors conclude that their results serve to highlight the relevance of policies such as childcare tax deductions and subsidies that effectively alter childcare costs.

As mentioned above, Powell (1997) also examines the impact of childcare costs on the labour supply of woman in Canada. A feature of this paper is that the author links two data sets, specifically the CNCC of 1988 and the 1988 Labour Market Activity Survey by household identification numbers. This allowed the author to obtain wage rates that were not reported on the CNCC.

The model specified by the author is that of Connelly (1992), where a spouse and at least one child under the age of six are present in the household. The model also considers the mother as the primary childcare provider. The utility function of the mother is specified by a composite good, leisure, and the quality of childcare. Therefore, the mother maximizes utility subject to budget and time constraints. The model further assumes that spousal labour supply decisions are exogenous, thereby treating spousal income as exogenous unearned income for the mother. The model implies that an increase in wages and a decrease in childcare costs raise the probability of labour force participation for the mother.

Empirical estimates generated consistent results: wages significantly increase the probability of labour force participation and hours worked whereas, an increase in per hour childcare costs significantly decrease both the former and latter. The elasticity for hours of work with respect to direct childcare costs was reported as -0.032, and the

elasticity of labour force participation with respect to childcare costs was reported as -0.38. The study further concluded that higher levels of unearned income had a negative impact on participation, this being significant for unearned income levels greater than 50,000. Moreover, when childcare costs were controlled for women with children aged 3-5, lower labour force participation rates were no longer affected. Similar findings were found on hours of work when childcare costs were used as controls.

Although Powell considers married women in her study, spousal decisions were modeled to be exogenous. Without loss of generality, however, spousal incomes were incorporated as unearned income for the mother. The implications of this model are then consistent in the case of single mothers such that any alimony received by the mother will be considered as unearned income. Alimony is, therefore, not expected to have any significant effects.

Thus far, the papers cited have specified labour force participation as a discrete dependent variable with probabilities associated with the effect of childcare costs. It is reasonable to conclude that childcare costs are significant and negatively correlated with the decision to take up work. Recall that the OCCS requires a set of minimum incomes to be eligible for the supplement. Attention now shifts to papers that address the effect of social assistance on labour supply.

Phipps (1995) examines the effect of the 1993 Canadian child benefit system. The author specifically considers the effects of the Earned-Income Supplement (EIS) on the behavioural consequences of labour supply decisions. The introduction of the EIS along with a basic child benefit essentially replaced the prior 1993 system that consisted of family allowance benefits, tax credit for dependent children, and the refundable child

tax credit. The Basic child benefit consisted of \$1,020 per child. The benefit is then taxed back at a rate of 5% for families having net annual incomes greater than \$25,921. The EIS consists of a benefit to be paid at a rate of 8% on family earnings over \$3750, to a \$500 maximum per family, per year. For net incomes greater than \$20,921 the EIS would be reduced by a rate of 10%, and entirely eliminated for net incomes greater than \$25,921.

As the objective of the EIS was to improve labour market incentives for parents having low earnings, Phipps examines whether this objective had been achieved. It is important to note how the structure of the EIS affects varying individuals. Individuals with low earnings (earnings between \$3750 and \$10,000) will effectively be given an 8% raise and, hence, expected to increase hours worked. For earnings greater than \$10,000 an individual receives a maximum lump sum EIS payment of \$500, and earns the market wage for any additional work. Labour supply models predict that hours worked may be reduced by the assumption that leisure is a normal good. To illustrate this reduction in hours worked, consider a market wage of \$7.50. An individual working 2000 hours yields earnings of \$15,000. Such an individual will continue to receive the \$500 lump sum as long as earnings are greater than \$10,000. If hours of paid employment are reduced by 66 hours, the individual loses \$495 dollars of earned income. However, by receiving the lump sum payment, the individual retains the same income. Furthermore, as income increases beyond \$20,921, the \$500 lump sum will be taxed back at a rate of 10%, effectively causing a pay cut of 10% for each additional hour of paid employment. Theory then predicts that such individuals are now likely to reduce the number of hours worked. Therefore, it becomes unclear how the EIS intends to improve labour market

incentives for low-income families. Specifically, the extent to which individuals experienced subsidies versus taxes or pure income effects required an empirical investigation.

Data from the 1986 Statistics Canada Family Expenditure Survey reveal that 1.6% of families with children have earnings between \$3,750 and \$10,000 and those with net incomes less than \$20,921. Therefore, the EIS will behave like a subsidy for only 1.6% of families with children, whereas 3% of families with children experience the pure income effect such that earnings are above \$10,000 and net incomes below \$20,921. Moreover, 5.5% of families that have net incomes greater \$20,921 and less than \$25,921 experience a tax on their EIS payments. These figures suggest that the implementation of the EIS causes adverse effects rather than improving labour market incentives for low-income families.

Woolley and Madill (1996) also examine the 1993 child tax benefit reform using the Social Policy Simulation Model and Database (SPSD/M), developed by Statistics Canada, in assessing the benefit system. Their approach was to consider the number of individuals who experience a decrease in marginal tax rates to those who experience an increase created by the EIS. Simulations using SPSSD/M were conducted to determine the effects of increasing low-income family annual earnings by \$100 on the amount of the EIS received. Hence, only families who were recipients of the EIS and families who would qualify to receive the EIS, given the extra \$100 in annual earnings, were considered. Of 778,000 eligible families, 22% faced a decrease in their marginal tax rates due to the supplement. Thirty six percent faced an increase in marginal tax rates. For this group, the EIS actually discourages increases in labour supply. Forty six percent

receive the full supplement and have unchanged labour supply levels. These author's findings conclude that the EIS actually increase average marginal tax rates, and provides the *very* poor some incentive to increase labour supply levels.

The remainder of the literature will focus on the incentive effects of in-work benefits and earned income tax credits. In what follows, Blundell's (2001) review on in-work benefits, with respect to the EITC is briefly discussed, followed by a brief overview of Michalopoulos et al. (2005) on the Canadian Self-Sufficiency Project (SSP). Lastly, Milligan and Stabile's (2004) findings on the National Child Benefit Program are presented.

The following in-work benefit schemes are target based rather than universal, targeting low-income households with a compulsory work contingent eligibility requirement. Eligibility in most cases also depends on the presence of children in the household.

Blundell (2000) provides a brief review of the Earned Income Tax Credit (EITC) reforms made in the United States. The EITC began in 1975 with the objective of offsetting social security payroll tax liabilities for low-income households with children. Eligibility for the EITC was dependent on a taxpayer's earned income, the number of qualifying children, residency tests, and relationships. The income requirement was that a taxpayer's income be positive. Eligibility for qualifying children required that they be under the age of 19, or 24 if the child attended school full time or was permanently disabled and residing with the taxpayer for more than six months. If a taxpayer did not have federal tax liabilities, a tax refund equivalent to the full amount of the credit would be provided.

The EITC consists of three regions in the credit schedule. The first region is a phase-in rate, which is a transfer of a subsidy rate multiplied by earnings. The second region consists of a maximum credit. The third region is the phase-out region, where the credit decreases at a specified rate. The EITC underwent expansions following the tax act reforms of 1986, 1990, and 1993. The most significant expansion occurred following 1993, where the phase-in rate increased from 18.5 % to 34 % for a taxpayer with one child. The expansion also increased the maximum credit from \$1,434 to \$2,152. Phase-out rates were also expanded, in 1996 a couple with one child would still be eligible for a credit with an income level of \$24,000.

Blundell summarizes the findings of Eissa and Liebman (1996) who investigate the EITC reform using a difference-in-differences estimation strategy on labour market behaviour. Treatment groups were identified as low educated single women with children, with controls defined as low educated single women without children. Estimated results found significant increases in movement into work. For individuals in work however, results indicate that income effects outweighed substitution effects, such that a negative effect on hours worked was found. Eissa and Hoynes (1998) examined the reforms on married couples, and found a reduction in the labour supply of married women due to negative income effects.

A similar program to the EITC is the Canadian SSP. The SSP was purely experimental and provided eligible recipients financial incentives to leave welfare and take up work. The SSP was a pilot program available in British Columbia and New Brunswick following 6,000 single parent families for six years beginning in 1993. Eligibility for the supplement required that participants in the study had to have been on

welfare for one year prior to the introduction of the program. Of the 6,000 eligible recipients only 3000 were selected to receive the program. The randomized method of choosing the participants who were offered the program, as opposed to those who were not (the treatment and control groups, respectively) allowed a comparison between the groups to determine the effectiveness of the SPP.⁴

Michalopoulos et al. (2005) discuss the “applicant study” of the SSP and summarize early findings of the effectiveness of the program.⁵ Their analysis considers 1422 applicants in the treatment group and 1430 in the control group who responded to the 30-month survey. All applicants were residing in Vancouver and the lower mainland British Columbia. Brief features of the SSP include: benefits being awarded only to recipients who left welfare and worked 30 hours or more per week, benefits being dependent on individual earnings instead of household earnings, and a time limited earnings supplement of 3 years. The supplement offered to participants in the treatment group was equal to half the difference between actual earnings and a target level of earnings, which was set to \$37,000 in British Columbia. Therefore, a participant in the treatment group working 30 hours per week at \$7.50 per hour, would earn \$11,700 and receive a supplement of \$12,650 per year $((\$37,000 - \$11,700)/2)$, with a total gross income of \$24,350.

Results of the SSP on labour market outcomes in the 9th quarter of follow up surveys between the treatment and control groups include an increase of 12.1 % in total employment rate for the treatment group, an increase of 12.5 % in the full time

⁴ See Card and Robbins (1988) for a more thorough discussion on the SSP.

⁵ Surveys were conducted at approximately 12, 30, 48, and 72 months after random assignment for 6 years to follow participants in the applicant study.

employment rate for the treatment group, and an increase of 20 average hours worked per month for the treatment group. All of the above were statistically significant at 1 % levels. Although the SPP supplements were quite generous, the pilot program clearly illustrates how in-work financial benefits encourage labour force participation and reduce individual dependency on social assistance.

Milligan and Stabile (2004) provide an examination of the 1998 National Child Benefit (NCB) program on labour market behaviour. The NCB initiative integrated with the nation wide Canada Child Tax Benefit and consisted of two programs; federally provided refundable tax credits and provincially provided initiatives. The federal component consisted of the National Child Benefit Supplement (NCBS). A distinguishing feature of the NCB program is its integration with provincially provided social assistance. At the discretion of provincial governments, some provinces choose to reduce the amount of the federally paid NCBS from provincial social assistance levels. Newfoundland, New Brunswick, and Quebec rejected this integration. As the NCB program consisted of provincially provided initiatives, certain integrated provinces that reduced social assistance payments then used these saved funds and introduced earned income supplements. Milligan and Stabile, use these variations to determine the relative effectiveness of the NCB program on labour market incentives. Provinces opting to integrate social assistance payments with the NCB program, increased labour market incentives, as the standard welfare wall decreased; with eligibility requiring positive labour market activity. Workers were now able to carry benefits in pursuing labour market activities. The authors' main concern is whether the program provided incentives on females to leave social assistance dependency. Therefore, the authors do not examine

labour supply outcomes for individuals already working. Moreover, the labour market outcomes of married and common law households were not investigated.

Their empirical estimation strategy relies on a triple-difference estimation procedure, with identification from province, number of children, and year variation. Benefits available to households were simulated at federal and provincial levels adjusting for Canadian taxes. The continuity approach of calculating benefit levels provides estimates on the marginal effects for changes in the NCB on labour market activity. Concerns of endogeneity with respect to the benefits received depending on earnings were addressed using an IV estimating strategy. The authors use province of residence, number of children, and year as instruments for the benefit level.

Findings from Milligan and Stabile conclude that when provinces integrated provincial social assistance with the national benefits, the provided incentives increased labour force participation rates.

Section III. The Ontario Child Care Supplement

The federal, provincial, and territorial governments amended on July 1, 1998 what was previously known as the federal Child Tax Benefit, and introduced the Canada Child Tax Benefit. The new Canada Child Tax Benefit combined the existing Working Income Supplement and the federal Child Tax Benefit, and also included a new National Child Benefit Supplement. Such changes were a joint initiative by the three levels of government to help reduce child poverty rates, and provide households with incentives to pursue labour market activities. In addition to the reforms of the federal government, the provincial government of Ontario added a tax-free OCCS to enhance the availability of funding to low income families with children below the age of 7.

The OCCS is administered by the Ontario Ministry of Finance, with prearranged monthly benefits. A benefit year begins in July and ends the following year in June. Supplements for the 12-month period are then calculated using family net income from the previous year's tax return(s). Benefit levels for eligible household recipients are determined by marital status, the number of children below the age of 7, and household income.

Annual OCCS benefit calculations are as follows:⁶

- (1) If family earnings are greater than \$5,000, the supplement will be *the greater of:*

⁶ Department of Finance.

- (i) 21 percent of earnings greater than \$5,000, for a household with one child.
 - (ii) 42 percent of earnings greater than \$5,000, for a household with two children.
 - (iii) 63 percent of earnings greater than \$5,000, for a household with three or more children.
- OR
- (i) 50 percent of qualifying child care expenses.
- (2) If family earnings are less than \$5,000, the supplement will be calculated as 50 percent of the childcare expenses reported on the previous year's income tax return(s). Families with no earnings, but qualifying childcare expenses are eligible.
- (3) For single parent families, the maximum annual supplement is \$1,310, for each child under the age of seven. For two-parent families, the maximum annual supplement is \$1,100, for each child under the age of seven.

For households with earnings in excess of \$20,000, benefits are then clawed back at eight percent. For single parents, benefits disappear at \$36,375, \$52,750, \$69,125, and \$89,500, for households with one child, two children, three children, and four children, respectively. For married and common law households, benefits disappear at \$33,750, \$47,500, \$61,250, and \$75,000 as the number of children increases from one to four.

The incentive effects of the OCCS for a single parent with one child are illustrated in Figure 1 using a static labour supply model. With no benefit, an individual's budget constraint is represented by the line segment ZA with point X^* as a utility maximizing point.

When benefit levels are introduced under the OCCS, the budget constraint is now line segment ZEDCBA. Line segments BA represents the benefit level when income is less than \$5,000. Segment BA is a demogrant illustrating point 2 above, which represents 50 percent of qualifying childcare expenses for the individual. Segment BC

represents a benefit equivalent to 21 percent of earnings greater than \$5,000. Segment CD represents the \$1,300 maximum benefit a single parent with one child is entitled to receive, which is then clawed back at eight percent for earnings greater than \$20,000. The eight percent claw back is represented by line segment DE. Point E illustrates the disappearance of benefits when income reaches \$36,375.

The empirical approach of this study examines the labour behaviour of individuals already pursuing labour market activity. Consequently, individuals with a preference point represent by point B with no labour market activity, are not examined. Similarly, individuals with preference point A, who were not working prior to the introduction of the OCCS and who have picked up work after are also excluded from the investigation. Therefore, when examining labour market behaviour with respect to the OCCS, utility maximizing points deviating from X^* , with positive work are examined. Specifically, whether substitution effects dominate income effects and yield increased labour market activity. Figure 1, unambiguously, depicts the case when substitution effects dominate, with a preference point represented by point X^{**} . The labour supply outcomes examined are weeks worked and hours worked per week.

Section IV. Empirical Strategy

This section presents the motivation for the difference-in-differences estimation strategy and the empirical methodology used in estimating the effects of the OCCS on labour supply decisions. The empirical methodology follows Milligan and Stabile (2004).

To capture the effect of the OCCS on labour supply decisions, consider a difference-in-differences estimator of the following type:

$$\delta = (Y_{TREAT2001} - Y_{TREAT96}) - (Y_{CONTROL2001} - Y_{CONTROL96}),$$

$Y_{TREAT2001}$ is the outcome variable of parents in 2001 with young children that are eligible to receive the OCCS supplement (post reform treatment group).

$Y_{TREAT96}$ is the outcome variable of parents in 1996 with young children that are eligible to receive the OCCS supplement (pre reform treatment group).

$Y_{CONTROL2001}$ is the outcome variable of parents in 2001 with older children that are not eligible to receive the OCCS (control group).

$Y_{CONTROL96}$ is the outcome variable of parents in 1996 with older children that are not eligible to receive the OCCS (control group).

δ is then defined as the difference in the outcome variables attributed to the OCCS between eligible and ineligible households, after and before the reform.

This paper defines the control group as parents with children who have no child satisfying the OCCS age requirement.⁷

The difference-in-differences estimator is estimated by running an OLS regression of the type:

$$(1) \quad Y_{it} = \beta_0 + \beta_1 year_t + \beta_2 supplement_i + \beta_3 1youngchild_i + \beta_4 2youngchild_i + \beta_5 1oldchild_i + \beta_6 2oldchild_i + \beta_7 3oldchild_i + \beta_8 X_{it} + e_{it},$$

The outcome variable, Y_{it} is observed labour supply outcomes, for household i in year t . The outcome variables used in this paper are weeks worked and hours worked per week. The variables $year_t$, $1youngchild_i$, $2youngchild_i$, $1oldchild_i$, $2oldchild_i$, and $3oldchild_i$ are defined as dummy variables. $1youngchild_i$ and $2youngchild_i$ take the value of one, if individual i has one young child or two young children, respectively. The *youngchild* dummies take the value of zero, if individual i has old children with no child that is young. Therefore, the variable $1youngchild_i$ measures the effect of having 1 young child as opposed to having an old child for individual i . Similarly, the variable $1oldchild_i$ measures the effect of having one old child as opposed to having a young child. The variable $year$ takes on the value of one, for 2001, and zero for 1996.

X_{it} is a vector of demographic control variables, such as sex, education, visible minority, and age. The variable *supplement* represents the dollar value of the OCCS and defined by the number of young children, year and earnings.

The coefficient β_2 identifies the effect the reform, and is equivalent to the difference-in-differences estimator, δ .

⁷ Precise definitions of age groups used as treatments and controls are presented in the data section.

The above estimation strategy is robust to any unobserved contemporaneous policies that differ at the year level that may affect labour force supply outcomes. Estimates will be robust provided that the excluded policy affects all households in a given year identically. That is, to ensure unbiased reform estimates it is necessary that the identified control group undergoes similar labour supply shocks during the reform.

The above estimation strategy relies on the assumption that the explanatory variables are uncorrelated to the error term, e_{it} . The following sub-section discusses concerns of endogeneity and presents alternative specifications to alleviate biased results.

Endogeneity

To ensure unbiased estimates, the value of the supplement must be orthogonal to variables affecting labour supply outcomes. Since the outcome variables estimated in this paper are weeks worked and hours worked, an important variable determining both outcomes are household earnings. Consequently, endogeneity arises as household income also determines the value of the supplement a household is entitled to receive.

Given that the value of the supplement received is dependent on household earnings a TSLS instrumental variable strategy used by Milligan and Stabile (2004) is used. The *first stage* estimates the variable *supplement* using the interaction between the year dummy and *1youngchild*, *2youngchild*, and *3youngchild* dummies as instruments. The *second stage* then estimates equation (1) using the estimated *supplement* from the *first stage*.

The TSLS approach relies on regressing the supplement on variables that are exogenous to the amount of benefit received. Here, it is assumed that the number of

children is exogenous to the value of the supplement. Since the variable *supplement* is now only accounting for variation in year and the number of children dummies, this would then alleviate the endogeneity as no households' earnings are a determinant of the estimated supplement.

A second concern is whether fertility decisions are responsive to the level of benefits received by the OCCS. The maximum supplement value for each additional child is \$1,310, and may not outweigh the costs of child rearing. Nonetheless, this concern is addressed. To minimize the likelihood of endogeneity arising from fertility decisions, equation (1) is also estimated excluding households with children less than the age of two from the treatment group. Recall, that the date of the benefit reform took place on July 1st 1998. Therefore, if fertility decisions were influenced by the reform, the earliest date for a child's birth following conception would occur after March 1999. This child would then be 2 years of age two months prior to 2001's census week.⁸ Given this small probable scenario, the treatment group may suffer a slight degree of contamination.

⁸ Census week is May 15th, 2001

Section V. Data

Data from the Canadian Census is conducted every five years in years ending with a “1” or a “6”. Since the child benefit reform took place on July 1998, data from the Public Use Microfiles (PUMF) on individuals from Ontario in 1996 and 2001 is used.⁹

The Individual PUMF of 1996 and 2001 contain data with key variables of interest. Specifically, the PUMF include relevant data for the purposes of this study on labour market activity, family composition, household earnings, education levels, and ethnicity. Census PUMF data on economic families which include more extensive data on family composition were not available during time of this study, therefore, married and common law households could not be examined.

The PUMF data do not contain actual values for the age of a child living in a household, instead, ages are grouped. For example, a household is asked whether a child is present between the ages of 2-5, with none under the age of two. Equation (1) is then estimated using the full PUMF sample for households with children under the age of 6 for 1996 data and children under the age of five for 2001 data as treatment groups. Control groups are defined for both years as households with children between the age of 6 and 14.¹⁰ When controlling for the endogeneity of fertility decisions, the PUMF is

⁹ The PUMF is a representative sample of the Canadian Census with a sample size of approximately 3 percent of the Census.

¹⁰ Ideally, one would compare households with children under age 7 and households with children above the age of 7 to precisely identify households that receive the supplement. Due to Census PUMF data limitations, the ideal case could not be examined. Therefore, the definition of the control group for identification strategies (1) and (2) is slightly contaminated as households with children aged 6 receive the supplement.

restricted to include households with children between the ages of 2-5 in the treatment group, whereas the control group consists of households with children aged 6-14.

As the interest of this paper is to examine the labour supply decisions of single parent households most affected by the reform, and whether substitution effects outweighed income effects. The following restrictions were then made: households with zero reported weeks worked and/or hours worked were dropped from the sample. This restriction permits investigating whether outcome variables increased due to stronger substitution effects, or decreased due to dominating income effects. To obtain estimates for households most affected by the reform, respondents with education levels including a university degree and above were excluded. Since less educated individuals are most likely to take up social assistance, the highest level of schooling in the sample includes those with some university, but no awarded degree.

Independent variables on ethnicity are used as controls. The PUMF provides data on the minority status of the respondents. Specifically, data on whether a respondent is a visible minority is used.

The outcome variables of interest are weeks worked and hours worked. Data on weeks worked from the PUMF reports the respondent's total weeks worked for the previous fiscal year. Reported data on hours worked is defined as the number of hours per week the respondent worked, for the week prior to census week.

Section VI. Results

Using the mean outcome variables for weeks worked to examine the effect of the supplement from the difference-in-differences estimator, estimates show:

$$\begin{aligned}\delta &= (Y_{TREAT2001} - Y_{TREAT96}) - (Y_{CONTROL2001} - Y_{CONTROL96}), \\ &= (44.63 - 39.85) - (45.90 - 44.97) \\ &= 3.6\end{aligned}$$

The differences in the mean outcomes between households receiving the supplement and those ineligible indicate that the affect of the supplement has increased weeks worked by 3.6 weeks.

Graphs of dependent variables

Figures 2 through 5 graph average weeks worked and average hours worked for single parents in the treatment and control groups, with respect to 1996 and 2001 outcomes. Figure 2 illustrates the average weeks worked for households with young children in 1996 and 2001. There is a significant increase of approximately 4 weeks for a parent with one child in 2001 relative to 1996. For households with two young children the increase in average weeks worked is approximately 2 weeks compared to 1996 levels.

Figure 3 illustrates average weeks worked for households with older children. Comparing the outcomes of 2001 and 1996, for women with two children, there are no evident differences between the working weeks for the different years. For a single

parent with one child; this group has tended to have worked approximately 2 more weeks in 2001 than in 1996 levels.

Examining hours worked for households with young children, figure 4 shows households with one child working approximately 2 additional hours per week in 2001, relative to 1996. Single parents with two children do not seem to have changed average working hours between 1996 and 2001.

Figure 5 illustrates average working hours for single parents with older children with an approximate increase of 3 additional hours worked. The 3 hours increase in 2001 relative to 1996 is constants for both levels of children.

A preliminary analysis examining the graphs illustrates that there has been a significant increase in weeks worked for households with young children (treatment group). Households with older children (control group), single parents with one child have increased weeks worked. Time trend effects are not evident in the graphical analysis, such that shocks may be affecting the difference in weeks worked for females with young children. This however, can be ruled out as there is no reason to believe that such a shock would not affect women with old children.

A more thorough analysis attempting to uncover the differences in the labour supply outcome variables are provided below.

Descriptive statistics of independent variables are presented in Table 1.

Table 2 presents descriptive statistics on income for households eligible to receive a supplement (treatment group).

OLS Results – Full Sample

Regression results for estimating equation (1) are presented in Table 3. The full sample group presents estimates with the assumption that fertility decisions are exogenous to the OCCS. All t-statistics are reported using robust standard errors. The first and second columns report the outcome variable for weeks worked and hours worked, respectively.

The variable *supplement* accounts for the non-linear interaction between earnings, year, and the number of young children. *Supplement* captures the marginal effect of an additional unit of benefits on weeks worked and hours worked. The estimated size of the effect of an additional \$1,000 in benefits on weeks worked is 2.3, and is statistically significant at the 1 percent level. Therefore, the effect of the OCCS on weeks worked for single headed households with young children is represented by an increase of weeks worked by 2.3 weeks. The marginal effect of an additional benefit of \$1,000 on hours worked is one additional hours worked. This estimate is also significant at the 1 percent level.

The *year* variable is significant at the 1 percent level with a point estimate of 1.4 and approximately 2.3 for weeks worked and hours worked respectively. The coefficient for having one young child (*child_1young*) has an expected negative sign on weeks worked. Since all respondents in the sample have children, the variable *child_1young* is the effect of having a young child instead of an old child. The coefficient on *child_1young* is insignificant. That is, there is an insignificant change on weeks worked if the child is young or old. The coefficient estimate on hours worked is positive, and also insignificant.

Coefficient estimates on having two young children (*child_2young*) all have a negative sign for both outcome variables. Estimates are significant for weeks worked, however marginally significant on hours worked. This is also expected as having two young children rather than two old children are likely to adversely affect labour supply outcomes.

Coefficients on minority status are insignificant, except for the variable labelled *other visible minority* on weeks worked.¹¹ Estimates on the education dummies show that the variable *non-university with trade certificate or diploma* is statistically significant and negative at the 5 percent level. All other education dummies are insignificant.

The *female* dummy variable is of particular interest, as single female with children work approximately 3 weeks less than single males with children. The coefficient is significant at the 1 percent level for both outcome variables. One plausible explanation for this result may be that the sample used includes children under the age of 2. If mothers relative to fathers have a greater psychological attachment in providing childcare for a child in their first year of life, it would then be expected that females would work fewer weeks than men. A second plausible explanation may be that a significant subsample of mothers were on maternity leave with fewer reported weeks than fathers.

TSLS Results – Full Sample

The identification strategy of equation (1) using OLS suffers from endogeneity, as household income levels is dependent on the value of the supplement. Columns three

¹¹ Other visible minority includes: Korean/Japanese/Southeast Asian/Filipino/Arab/West Asian/Latin American

and four present equation (1) using TSLS. The variable *supplement* now captures variation from the year dummy interacted with the number of young children dummies, but not income. Coefficient estimates for *supplement* show that the effect of the supplement on weeks worked is significant at the 1 percent level. The effect on hours worked has become insignificant. The TSLS estimates shows that the income effects and substitution effects on hours worked neutralize one another. Comparing the OLS and TSLS results for the controls in Table 1, the obtained estimates are stable across both estimation strategies.

OLS and TSLS Results: Controlling for Endogenous Fertility

Table 4 presents estimates of equation (1) for households with children between the ages of 2-5 in the treatment group, whereas the control group consists of households with children aged 6-14.

The OLS estimates show that the effects of the *supplement* on both weeks worked and hours worked are positive and significant. From the TSLS estimates, *supplement* has a positively significant on weeks worked and an insignificant effect on hours worked.

The variable for having one young child (*child_1young*) is positive and significant for weeks worked using OLS and TSLS. Comparing the estimates reveals that the TSLS estimate is smaller than the OLS estimate. As household income levels are endogenous to supplement levels, OLS estimates are biased upwards. That is, as household earnings increase, the value of the supplement also increases, overestimating the effect of the OCCS. This upward bias is alleviated using TSLS, as estimates are now slightly smaller. The reduction of the upward bias is also evident when examining hours worked. The

OLS estimate is positive, whereas the TSLS estimate is negative. Both estimates on hours worked are insignificant.

Comparing Table 3 and Table 4, estimates for the education and visible minority status controls are stable across estimates. Coefficients on *supplement* and *year* are also stable across tables. The coefficients on having one and two young children differ in Table 3 and 4. The main difference is due to the sample in Table 4 not including children that are under the age of two. Point estimates in Table 3 are negative, since children under the age of 2 require more childrearing time from the parent. The point estimates in Table 4 are positive and significant. Given the similarities on weeks and hours worked, it is not evident that fertility decisions have been responsive to the value of the supplement.

Examining the *female* dummy variable across Table 3 and 4, the effect of being female remains negative and significant on weeks worked and hours worked. Estimates in Table 4 exclude children under the age of two. Therefore, there is no evidence suggesting that mothers work less than fathers because of some emotional attachment a mother may have in providing care during a child's infancy. Moreover, as estimates are stable across both tables, the probability of a large number of mothers on maternity leave in the sample cannot explain females having fewer weeks worked.

The estimates obtained allow for considering the marginal effects of the OCCS, on labour supply decisions. Estimates reveal that a \$1,000 increase in supplements, increases weeks worked by approximately two to three weeks for single parent households with young children present at home. The estimates on hours worked illustrates that households did not significantly respond to the OCCS.

Section VII. Discussion

The analysis presented in this paper has considered the effect of the OCCS reform on households with positive working weeks and hours. Results show that the affect of the supplement leads to substitution effects dominating income effects, thus increasing weeks worked. An important consideration not taken into account is whether the OCCS induced individuals to take up work after the introduction of the reform. Milligan and Stable (2004) examine the National Child Benefit Reform and conclude that the national benefits provided incentives for those not in the labour force to take up additional work. However, Milligan and Stable do not consider how such benefits affect individuals already in work; their investigation does not consider the substitution and income effects for individual pursuing labour market activities. This paper differs from Milligan and Stable (2004) such that the provincial component (OCCS) of the NCB program on income and substitution effects have been examined.

Section VIII. Conclusion

This paper has examined the provincial component of the NCB reform of 1998. The provincial government of Ontario added a tax-free childcare supplement to enhance the availability of funding to low income families with children below the age of seven. Using variation on labour market outcomes before and after the reform change, estimated results show that the marginal effect of the OCCS provides incentives on increasing the labour supply of single parent households with children.

Obtained results indicate that the target based approach of the OCCS is superior to universal programs, such that, on the intensive margin there are positive incentives on increasing labour supply. Results here are also consistent with the EITC literature, which favour target based programs rather than programs that are universal in nature.

The findings of this paper also suggests that the OCCS supplement has been successful at offsetting child care costs, as the labour supply of single parents with preschool aged children have increased.

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Appendices

Figure 1: Static Labour Supply Model

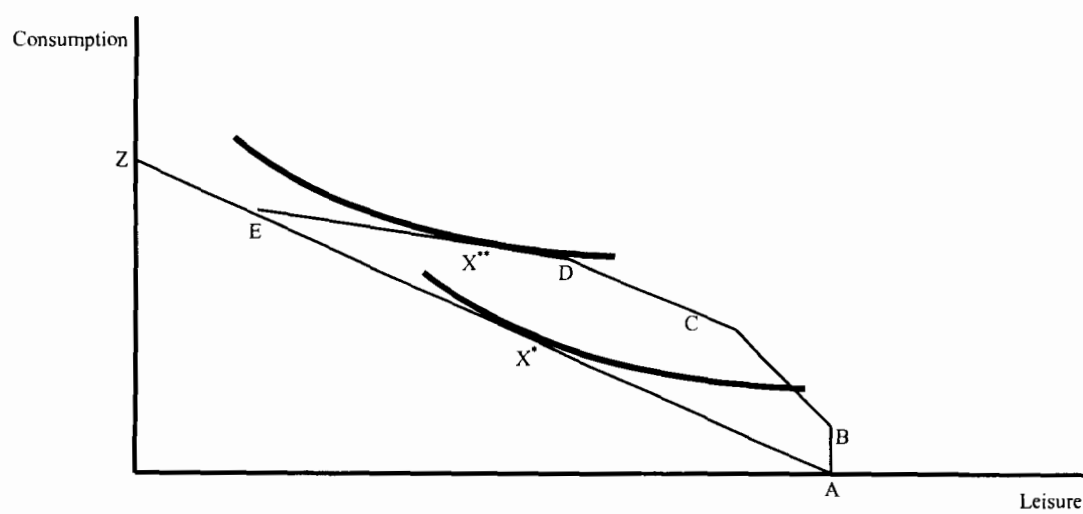


Table 1: Descriptive Statistics

Descriptive Statistics for Independent Variables			
Variable	Frequency	Mean	St. Dev
supplement*	395	\$ 1,056.83	630.56
income >0	4890	\$ 28,631.59	22262.02
child_1young	1173	22.08%	0.41
child_2young	179	3.37%	0.18
child_1old	1966	37.00%	0.48
child_2old	1684	31.70%	0.47
child_3old	549	10.33%	0.30
female	4501	84.72%	0.36
south east Asian	87	1.64%	0.13
Chinese	318	5.99%	0.24
other visible minority	240	4.52%	0.21
Grade 5 - 8	62	1.17%	0.11
Grade 9 - 13	746	14.04%	0.35
High School graduate	743	13.98%	0.35
Trade certificate	148	2.79%	0.16
non univ. without diploma	520	9.79%	0.30
non univ. with trade cert. or diploma	447	8.41%	0.28
non univ. with other diploma	1232	23.19%	0.42
some university	176	3.31%	0.18
# of observations	5313		
* for eligible households			

Table 2: Income statistics

Income statistics for households eligible to receive a supplement

Income	Percent	Mean Income	Mean Supplement
0 < income >= \$5000	38.85%	\$2,189.41	\$0.00
\$5000 < income <=\$11238	12.38%	\$8,530.15	\$859.85
\$11238 < income >=\$20000	18.73%	\$15,829.26	\$1,494.05
\$20000 < income >=\$36375	28.95%	\$27,816.06	\$873.85
\$36375 < income >=\$52750	1.08%	\$44,775.00	\$638.00
\$52750 < income >=\$69125	0.00%	\$0.00	\$0.00
income > \$69125	0.00%	\$0.00	\$0.00

Figure 2: Average weeks worked for single parents with young children

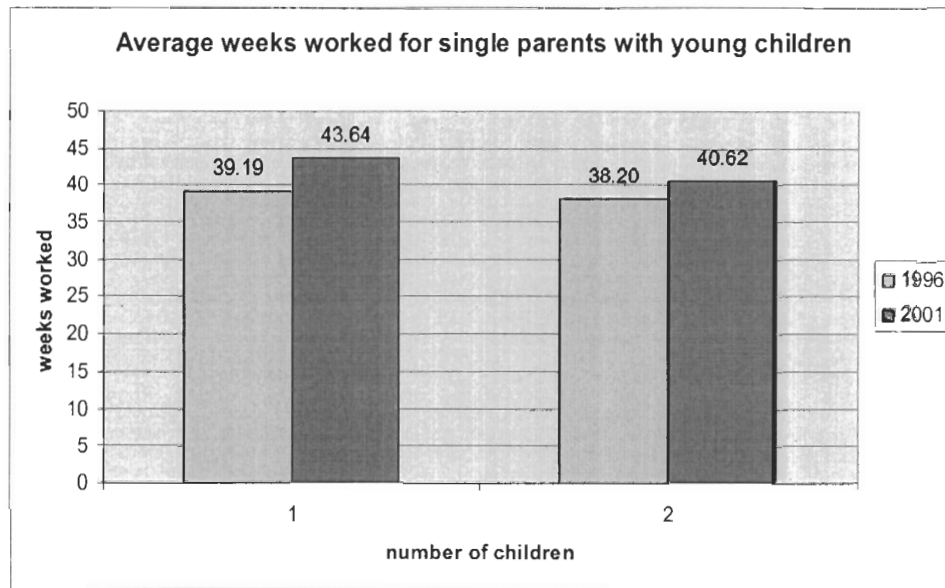


Figure 3: Average weeks worked for single parents with old children

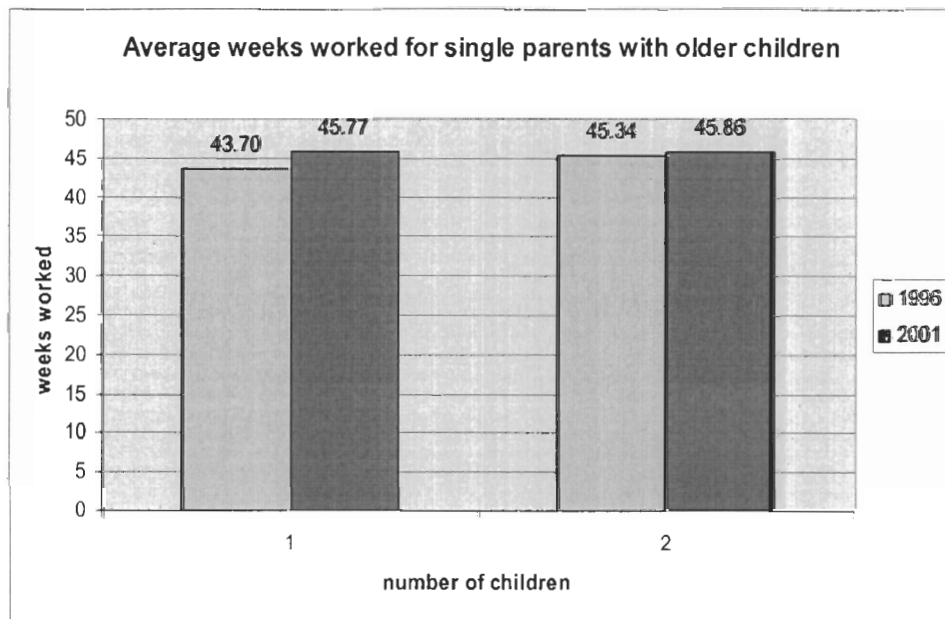


Figure 4 Average hours worked for single parents with young children

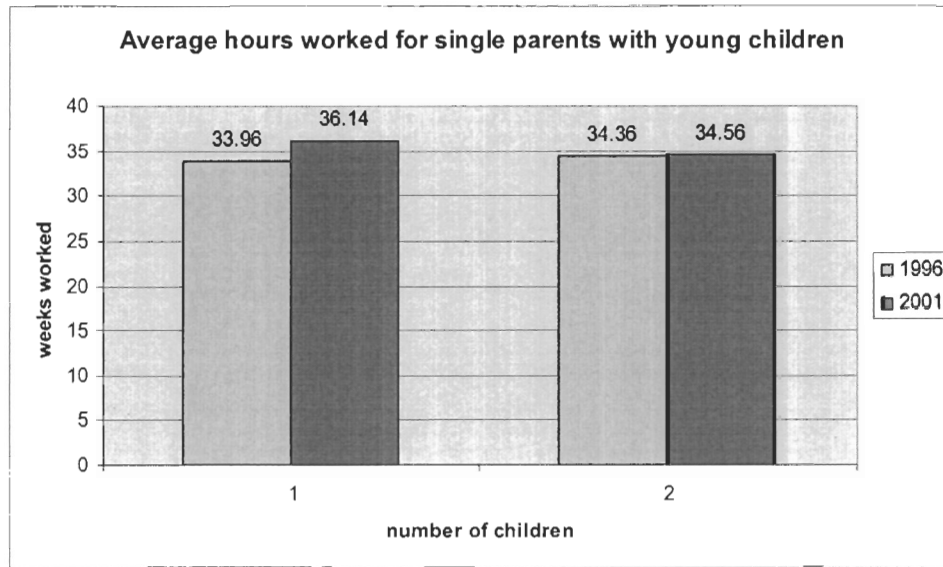


Figure 5 Average hours worked for single parents with old children

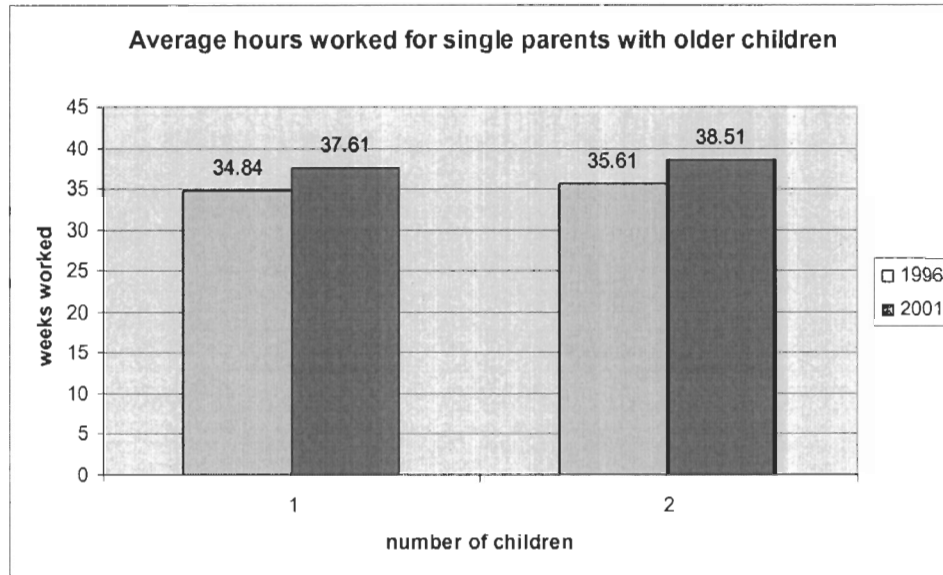


Table 3: Weeks and hours worked regressions

Dependent Variable:	WEEKS AND HOURS WORKED REGRESSIONS: full sample			
	Weeks OLS	Hours OLS	Weeks IV	Hours IV
Coefficient estimates				
<i>first stage</i>				
child_1young * year	—	—	0.49 (31.67)**	0.49 (31.67)**
child_2young * year	—	—	1.25 (34.95)**	1.25 (34.95)**
R Sq.	—	—	0.49	0.49
supplement	2.36 (3.79)**	1.32 (2.31)*	2.57 (2.14)*	-0.39 -0.37
year	1.47 (4.09)**	2.27 (6.10)**	1.44 (3.81)**	2.53 (6.37)**
child_1young	-0.72 -1.06	0.16 -0.26	-0.77 -1.05	0.53 -0.82
child_2young	-3.12 (2.40)*	-2.22 -1.80	-3.24 (2.22)*	-1.23 -0.92
child_1old	0.11 -0.15	-0.35 -0.55	0.11 -0.16	-0.41 -0.64
child_2old	-0.18 -0.23	0.05 -0.07	-0.17 -0.22	0.01 -0.01
child_3old	-1.28 -1.41	0.45 -0.50	-1.27 -1.41	0.41 -0.45
female	-2.99 (7.94)**	-8.73 (17.82)**	-3.00 (7.94)**	-8.69 (17.75)**
south east Asian	0.25 -0.20	1.56 -1.25	0.24 -0.19	1.65 -1.32
Chinese	-1.15 -1.58	1.04 -1.34	-1.16 -1.60	1.13 -1.45
other visible minority	-3.37 (3.30)**	0.92 -1.10	-3.37 (3.30)**	0.91 -1.09
Grade 5 - 8	-3.20 -1.49	1.91 -0.79	-3.20 -1.49	1.94 -0.81
Grade 9 - 13	-2.23 -1.58	-0.81 -0.56	-2.24 -1.58	-0.76 -0.52
High School graduate	-0.49 -0.37	0.27 -0.20	-0.50 -0.38	0.34 -0.24
Trade certificate	-2.37 -1.51	0.13 -0.08	-2.37 -1.51	0.14 -0.09
non univ. without diploma	-1.33 -1.13	0.21 -0.17	-1.34 -1.13	0.26 -0.22
non univ. with trade cert. or diploma	-2.40 (2.20)*	-0.85 -0.77	-2.40 (2.21)*	-0.77 -0.70
non univ. with other diploma	-0.57 -0.70	0.01 -0.02	-0.58 -0.71	0.09 -0.10
some university	0.25 -0.23	-0.94 -0.82	0.25 -0.23	-0.91 -0.80
highest level of schooling sq.	-0.01 -0.97	0.02 -1.61	-0.01 -0.98	0.02 -1.65
age Sq	-0.02 (7.47)**	-0.01 (4.26)**	-0.02 (7.49)**	-0.01 (4.12)**
age	1.84 (8.62)**	1.03 (4.81)**	1.85 (8.64)**	1.00 (4.64)**
Constant	8.32 -1.84	20.72 (4.78)**	8.26 -1.83	21.22 (4.87)**
Observations	5313			
R-squared	0.07	0.09	0.07	0.09
Robust t-statistics in parentheses				
* significant at 5% level; ** significant at 1% level				

Table 4: Weeks and hours worked regressions

Dependent Variable:	WEEKS AND HOURS WORKED REGRESSIONS: controlling for endogenous fertility			
	Weeks OLS	Hours OLS	Weeks IV	Hours IV
Coefficient estimates				
<i>first stage</i>				
child_1young * year	—	—	0.52 (35.1)**	0.52 (35.1)**
child_2young * year	—	—	1.30 (38.62)**	1.30 (38.62)**
R Sq.	—	—	0.56	0.56
supplement	2.13 (2.90)**	1.27 -1.88	2.58 (2.27)*	-0.91 -0.82
year	1.58 (4.44)**	2.34 (6.39)**	1.54 (4.25)**	2.54 (6.76)**
child_1young	2.37 (3.00)**	0.81 -1.19	2.26 (2.71)**	1.36 -1.93
child_2young	0.10 -0.07	-2.46 -1.73	-0.20 -0.13	-1.01 -0.64
child_1old	2.10 (3.37)**	0.13 -0.22	2.10 (3.37)**	0.12 -0.21
child_2old	1.63 (2.60)**	0.44 -0.74	1.63 (2.60)**	0.45 -0.75
child_3old	0.53 -0.68	0.84 -1.08	0.53 -0.67	0.85 -1.09
female	-2.89 (7.69)**	-8.71 (17.81)**	-2.90 (7.70)**	-8.68 (17.76)**
south east Asian	0.29 -0.23	1.60 -1.28	0.26 -0.21	1.71 -1.37
Chinese	-0.89 -1.23	1.14 -1.47	-0.90 -1.25	1.17 -1.52
other visible minority	-3.42 (3.35)**	0.90 -1.08	-3.42 (3.35)**	0.90 -1.08
Grade 5 - 8	-3.07 -1.44	1.91 -0.79	-3.08 -1.44	1.94 -0.81
Grade 9 - 13	-2.09 -1.49	-0.78 -0.54	-2.10 -1.50	-0.76 -0.52
High School graduate	-0.33 -0.25	0.31 -0.22	-0.34 -0.26	0.36 -0.26
Trade certificate	-2.29 -1.47	0.15 -0.09	-2.30 -1.48	0.17 -0.11
non univ. without diploma	-1.19 -1.02	0.23 -0.19	-1.20 -1.02	0.26 -0.22
non univ. with trade cert. or diploma	-2.23 (2.06)*	-0.81 -0.73	-2.24 (2.07)*	-0.76 -0.69
non univ. with other diploma	-0.48 -0.59	0.03 -0.04	-0.49 -0.60	0.10 -0.11
some university	0.31 -0.28	-0.95 -0.83	0.30 -0.27	-0.91 -0.80
highest level of schooling sq.	-0.01 -0.93	0.02 -1.62	-0.01 -0.93	0.02 -1.64
age Sq	-0.02 (7.71)**	-0.01 (4.26)**	-0.02 (7.74)**	-0.01 (4.14)**
age	1.89 (8.89)**	1.02 (4.82)**	1.89 (8.93)**	0.99 (4.68)**
Constant	5.43 -1.22	20.56 (4.81)**	5.35 -1.20	20.96 (4.90)**
Observations	4571			
R-squared	0.08	0.09	0.08	0.09
Robust t-statistics in parentheses				
* significant at 5% level; ** significant at 1% level				