

SIMULATING THE EFFECTS OF CHILD CARE POLICY IN CANADA

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Government child care policies have multiple effects. They affect female labour force participation and hours of work and therefore affect both pre-tax and post-tax family incomes. These policies may affect the distribution of incomes, participation in social assistance, duration of receipt of social assistance, the supply of child care, costs of child care to parents, quality of child care, and the demand for particular types of child care. As a result, these policies will influence child development and school readiness of children, employment and incomes of child care workers, the decisions of mothers and fathers to take or stay on maternity or parental leave, and the level of government expenditures.

The broad range of effects is reflected in the graphic popularized by the Childcare Resource and Research Unit of the University of Toronto which is reproduced below.



Typically, the analysis and evaluation of child care policy by researchers will focus on a small number of these dimensions (e.g., labour force participation rather than child development, child health rather than women's equality, etc.) Policy makers may be suspicious of the work of academics partly for this reason; the special interests of the researcher are reflected in the range of issues considered decisive for the evaluation of policy.

Further, most of the difficult decisions facing child care policy makers are a result of the tradeoffs among policy objectives, or tradeoffs between costs and beneficial outcomes for children and parents. To assess these tradeoffs, it is necessary to determine the approximate magnitudes of a wide variety of different effects and costs of child care policy.

This paper is the output of a project which tries to measure empirically a wider range of child care's effects than are normally considered in one study. To do this, we build a microsimulation model of the child care sector of the Canadian economy.(1) This work is not yet completed.

Section I of this paper motivates the importance of considering the effects of governmental child care policy. Section II itemizes the main types of current policy whose impacts we wish to model. Section III outlines the main components of the model which represent decision-making by families and institutions. Section IV provides details on the empirical form of the equations which are estimated. Section V describes the structure of the simulation model, the policy mechanisms, and describes the simulation outputs available. Because the model described in the first sections of this paper has not yet been estimated, Section VI describes a similar, simpler model which has been estimated for lone mother families with preschool children. Section VII presents some simulations from that model. Section VIII describes the next steps in this research project, some of which will be accomplished before the conference at which this paper is delivered.

I. Why Child Care Policy Is Important

Most young Canadian children use non-parental care arrangements every week. The Canadian National Child Care Survey of 1988 found that 74% of all children in Canada who are between 18 months old and 6 years of age are in regular non-parental care arrangements.(2)

1 Researchers in other countries are also experimenting with the use of microsimulation models to assess the impacts of child care policy. For Australia, see Schofield, Polette and Hardin (1999). For Britain, see Blundell, Duncan, MacCrae and Meghir (1999).

2 Goelman, H. et al. *Where Are The Children? An Overview of Child Care Arrangements in Canada*, Statistics Canada Catalogue 89-527E, 1993, p. 35.

Non-parental child care arrangements are used for a variety of reasons. First of all, for many families, child care permits employment. Most mothers of young children now work in the paid labour force. In 1967, 17% of mothers with preschool children were in the labour force.⁽³⁾ Today, over two-thirds of these mothers are in the labour force.

Second, many children do not have siblings and may benefit from structured opportunities for play. Because of continuing declines in fertility, most Canadian children are “only” children, for most or all of their early years. Third, mothers who decide to stay at home with their children nearly always decide to use senior kindergarten and junior kindergarten services, where available, as an introduction to the school system and those with higher family incomes are increasingly likely to use nursery schools as preparation for school, no matter what the age of child and labour force status of the mother. As a result, many families with a mother at home use some form of early childhood care and education. In sum, non-parental child care is a reality for most young children most of the time; this is often, but not always, associated with parental employment.

II. Child Care Policies in Canada

Over time, a pastiche of child care policies and programs in Canada has developed, introduced by different levels of government, and designed to achieve diverse objectives. There are several types of policies, some provincial and some federal, which affect the provision and use of child care services in Canada.

Kindergarten

Kindergarten is not typically considered to be a program delivering child care services. In reality, however, it is the only program (with the partial exception of child care in Quebec) providing early childhood education and care that is universally available, regardless of income, labour force status or other criteria. Virtually all Canadian children (except in P.E.I.) who are between four years eight months of age and five years eight months of age at the beginning of September will attend non-compulsory kindergarten free of charge in the public school system. In Ontario, most children who are a year younger than this will attend junior kindergarten. Kindergarten is nearly always offered on a part-time basis (whether in the morning, the afternoon, or on alternate days). Several years ago, New Brunswick moved from having no public kindergarten, to offering it on a full-day basis, with compulsory attendance. In 1997, as part of wholesale child care reform, Quebec began to provide free full-day kindergarten for five-year-olds within the school system.

3. Childcare Resource and Research Unit *Statistics Summary: Canadian Early Childhood Care and Education in the 1990's*, 1999, University of Toronto.

Maternity Benefits

Maternity benefits, in an amount related to previous employment earnings, are provided to eligible mothers through the Employment Insurance scheme. In effect, maternity is considered to be a legitimate cause of absence from work, like unemployment or sickness, and therefore eligible for payment of insurance benefits. Benefits depend upon eligibility for EI (working for an employer for 700 hours of work in last 52 weeks), and are paid for 15 weeks plus 10 additional weeks of parental benefit. Mothers receive 55% of insurable earnings up to \$413/wk, but may have to pay back benefits at tax time if income is over about \$50,000. The maternity benefit paid may depend upon the unemployment rate in the local area. Mothers whose family is eligible for the Child Tax Benefit will receive up to 65% of previous earnings.

One of the reasons for providing maternity benefits through the Employment Insurance program (E.I.) is that payment of unemployment benefits is constitutionally a federal responsibility; other maternity issues, such as eligibility for maternity leave, fall under provincial jurisdiction. However, because E.I. rules were designed to apply to those seeking unemployment benefits, they also affect maternity benefit claimants. For instance, there is a two-week waiting period for maternity benefit (out of 17 weeks of leave, only the last 15 are paid).

It might be argued that maternity benefit policy and child care policy are quite distinct and different things. However, most new mothers do not medically require a full 15 or 17 weeks to recover from childbirth. Some of the time is designed to allow mother and child to bond, the mother to continue breastfeeding, and the mother to adjust the household arrangements to the arrival of the new family member. The child care function of this leave is even more obvious with the adjunct to maternity leave known as parental leave (or child care leave). Parental benefits are, since 1991, available to either parent (with, however, an additional two-week waiting period if taken by the father) for 10 weeks following maternity leave. Extension of the sum of maternity and parental benefits to cover a full year, together with the elimination of this extra waiting period, has recently been announced.

Child Care Expense Deduction

The Income Tax Act has, since 1972, allowed families with work-related child care expenses to deduct these expenses from taxable income before income tax rates are applied. Logically, the income used to pay these expenses is not properly considered to be part of discretionary income which should be subject to tax. Expenses are claimable only if they are required to earn income, so they can only be claimed by either a single parent who works or the lower-earning parent in a two-parent family if both spouses are in the paid labour force. A limit of \$7,000 per child under 7 and \$5,000 per child between 7 and 16 is intended to ensure that only the necessary level of child care expenditures can be claimed. This amount is not sufficient to cover the cost of licensed child care for infants and toddlers in some parts of Canada.

Many observers argue that the Child Care Expense Deduction (CCED) reduces the cost of child care, but this is a potentially misleading observation. Since the Child

Care Expense Deduction can apply to virtually all types of paid child care (except that provided by relatives under 21 years of age), the CCED is properly seen as part of the process of defining taxable income.(4) As a society, we allow families to deduct child care expenses from income for the same reason that we allow a self-employed person to deduct the cost of renting office space - both are necessary expenses of earning income. Put another way, it is only earned income net of child care expenses that would be available for discretionary spending by the family, hence it is only earned income net of child care expenses that should be taxed.

Child Care Subsidies

Families with sufficiently low incomes are eligible in all provinces and territories for child care subsidies which may reduce the price of licensed child care to zero or to a relatively small amount. Eligibility for child care subsidy is determined partly by family income, but partly by social criteria as well. For instance, most subsidies are only available to families in which the parent(s) are employed or in training for employment. Subsidies are generally also available when children have specific developmental handicaps or when family functioning is impaired in specific ways.

As may be obvious from the above description, the origins of child care subsidy rules, and the primary functions of child care subsidy policies, are strongly related to welfare and social assistance objectives. In most provinces and territories, the income criteria ensure that only single parent families will get full subsidy; child care subsidies are intended to permit eligible parents to be employed, or train for employment, in order not to establish long-term dependence on public assistance. Approximately 163,000 children received subsidies for the use of regulated child care services in 1998.(5) Subsidies to low-income (generally single parent) households provide approximately 30% of revenues in an average child care centre.(6)

4 The role of the Child Care Expense Deduction in creating horizontal tax equity between parents in one-earner and two-earner families is discussed in Krashinsky, M. and G. Cleveland *Tax Fairness for One-Earner and Two-Earner Families: An Examination of the Issues*, 1999, CPRN Discussion Paper No. F07, Ottawa.

5 Childcare Resource and Research Unit Statistics Summary: Canadian Early Childhood Care and Education in the 1990's, 1999, University of Toronto.

6 Gillian Doherty et al., *Centre Resources and Expenditures*, 2000, Preliminary Report from the You Bet I Care! project at www.cfc-efc.ca/docs/00001311.htm, p.4.

Operating Grants

Some provinces and territories provide regular operating grants to licensed or regulated child care facilities (centres and family homes). The purpose of these grants may be to stabilize funding to these services and/or to enhance the wages and benefits of low-paid staff in this primarily parent-funded service. This operational funding for child care has been highly variable across provinces/territories and across time within individual provinces/territories. In 1998, operating and other grants from government provided approximately 18% of revenues of an average child care centre.(7)

Regulations

Most types of care are not effectively regulated by government. Licensed child care centres and licensed family homes are the exception. Staff-child ratios which vary by the age of the child, maximum group sizes, teacher education qualifications, amount of indoor and outdoor space, and various other features of care are subject to provincial regulation.(8)

Policies Affecting Mothers' Employment or Family Income

Other government policies, which are not explicitly viewed as child care policies, will affect child care use through their impact on mothers' employment decisions or on family income. Social assistance policy, the Canada Child Tax Benefit, and the tax system in general, are perhaps the most important of these. Social assistance eligibility depends on marital status and number of children, earnings from work, province or municipality of residence, and may depend upon child care expenses. Benefit-reduction rules will affect the mother's effective wage rate. The amount paid to a family under the Canada Child Tax Benefit is dependent on family net income (gross income minus EI and CPP/QPP, as well as claimed child care expenditures) and the number of children. Other government policies such as employment equity, pay equity and minimum wage policies could have important impacts on mothers' employment and therefore on the use of child care.

In sum, Canadian child care policies are typically targeted by age of child or income to meet particular needs: assistance for families with new born children until the children are about six months of age, lower cost child care for some children in poor families whose parents meet strict income and work criteria, some reduction of taxes on income which is spent on employment-related child care, and kindergarten for nearly all children for 2 1/2 hours per day once they reach age five.

This contrasts with prevailing policies towards early childhood care and education in some other countries. In France, Spain, Denmark, Sweden, Finland and other European countries and, now, in Quebec, universal early education for 3-5 year-

7 Gillian Doherty et al., *Centre Resources and Expenditures*, 2000, Preliminary Report from the You Bet I Care! project at www.cfc-efc.ca/docs/00001311.htm, p.4.

8 See Childcare Resource and Research Unit *Early Childhood Care and Education in Canada: Provinces and Territories*, 1998, 2000. Toronto: University of Toronto.

olds or 2-5 year-olds is the norm and low-cost publicly-subsidized arrangements for large numbers of children younger than that is typically available. Countries with predominantly Anglo-Saxon heritages (United States, Great Britain, Australia, New Zealand, and Canada) generally provide modest public support for early childhood care and education. Although there are considerable differences among the Anglo-Saxon countries, their similarities in child care policy outweigh their differences.

III. General Outline Of The Model

Our microsimulation model includes these features of the Canadian child care market :

1. The choice of a particular type of child care arrangement for a child amongst up to eight types of child care. Demand for each type depends on the price, and other attributes of that type of care, and on child characteristics, family characteristics, characteristics of the mother and fathers' work situations and income.
2. The decision about the mother's participation and hours of work in the labour force. The decision to work part-time or full-time depends on the expected wage, other family income, amount of and eligibility rules for social assistance, ages and number of children, various family characteristics, and the price of child care services.
3. The decision of employed mothers of new-born children about how long to stay on maternity/parental leave. For mothers with a child less than, say, one year of age, families decide among maternity leave and full-time or part-time employment for the mother.
4. The supply and price of child care services offered. Supply of each type of care is modeled separately. Absence of data compels us to assume that most types of care are supplied perfectly elastically, with a number of factors determining the price level at which supply is provided. Prevailing wage levels, the rate of unemployment amongst female workers, the minimum wage rate, regulations affecting each type of care, and grants to different types of care are amongst the factors determining the supply-price of each type of care.
5. The wages earned by centre-based child care workers. Wages depend on the characteristics of the worker (education, experience, narrowly-defined occupational category, etc.).

Given existing data availability, some of these features are estimated (child care choice, employment choice and the taking of maternity/parental leave, wages on centre-based workers), while algorithms are constructed to represent others.

Modelling employment and child care choice

It is assumed, for simplicity, that mothers are primarily responsible for either providing child care themselves, or for making alternative child care arrangements. This is still broadly an accurate approximation to reality (e.g., in the 1988 Canadian National Child Care Survey, in over 95% of cases the mother declared herself to be the “person most knowledgeable” about child care arrangements).

Each family with a preschool child makes both an employment decision for the mother and child care decisions for the preschool children. It is assumed that this set of decisions is structurally distinct for lone mother families and families in which there are two parents. This is true partly because of the absence of the father for child care assistance and income of the father in the lone mother family, but also because of the eligibility of most lone mothers for social assistance. As a result, we estimate the child care and employment decisions of single and married mothers separately. (The child care decisions of employed and not employed mothers are also distinct. We estimate child care choice parameters separately for employed and not employed married mothers).

We assume that the employment and child care decisions have the following structure. Employment decisions (both the decision to be employed and to work either part-time or full-time) are made in a forward-looking manner. In other words, employment is affected by the usual variables (e.g., expected wage, other income, age, education, etc.) but also by child care variables (e.g., the price of licensed care, the price of other modes of child care, the availability of licensed child care and other modes of care, the number of preschool children etc.).

Child care arrangements for the youngest child in the family are made conditional on employment status and hours of work of the mother. The decision about the main type of child care to use for the youngest child also depends, naturally, on the price and availability of different modes of care, as well as on various family characteristics.

Child care arrangements for other preschool children in the family are made conditional on both the employment status and hours of work of the mother, and on the child care choice made for the youngest child. The type of child care chosen for these other children will, of course, also depend on the price and availability of various modes of care, as well as on various family characteristics.

Of course, in a completely generalized model, families would decide on all decision-variables simultaneously. We model these decisions in a sequential fashion. Given information about wages, taxes, social programs, and child care prices, families decide on the mother’s labour force status. Given this decision, they then decide how to care for the youngest preschool child. Given these decisions, the decision about the care of all other preschool children is made.

In particular, each mother is assumed to decide amongst the following employment states:

- EFT - Employed Full Time
- EPT - Employed Part Time
- MPL - On Maternity/Parental Leave
- NILF – Not in the labour force

The child care choices available include:

- DCC - Day Care Centre (includes licenced or regulated family home care)
- OHNR - Out of Home Care by Paid Non-Relative (unregulated)
- IHNR - In Home Care by Paid Non-Relative
- REL - Relative (not father) Care, in or out of home, paid or not
- FATH - Father's care while mother is employed
- MAW - Mother cares for child while she is at work (e.g., while working at home)
- NSK - Nursery School/Kindergarten
- PAR - Care of child exclusively by mother who is not employed (or by her spouse)

(note - all the types of care other than PAR are "supplementary" to the parental care which is provided while the mother is not at work).

Not all forms of care are consistent with every employment status. Because we will be estimating the behaviour of single-parent and two-parent families separately, the possible choice sets can be summarized by the two tables on the next page, where a “ ” means this combined choice is possible and an “X” means the combined choice is not possible (or is too rare to be modelled).

TWO-PARENT FAMILIES

EMPLOYMENT STATUS OF MOTHER

| | | EFT | EFT | MPL | NILF |
|----------------------------|------|-----|-----|-----|------|
| CHILD CARE MODE | DCC | | | X | |
| | OHNR | | | X | |
| | IHNR | | | X | |
| | REL | | | X | |
| | FATH | | | X | X |
| | MAW | | | X | X |
| | NSK | | | X | |
| | PAR | X | X | | |

SINGLE-PARENT FAMILIES

EMPLOYMENT STATUS OF MOTHER

| | | EFT | EPT | MPL | NILF |
|----------------------------|------|-----|-----|-----|------|
| CHILD CARE MODE | DCC | | | X | |
| | OHNR | | | X | |
| | IHNR | | | X | |
| | REL | | | X | |
| | MAW | | | X | X |
| | NSK | | | X | |
| | PAR | X | X | | |

- The key variables affecting child care and employment decisions are:
1. Prices of each child care mode. P_{DCC} , P_{OHNR} , P_{IHNR} , P_{NSK} are all non-zero prices. The explicit prices of other modes are assumed to be equal to zero: $P_{MAW} = P_{FATH} = P_{REL} = P_{PAR} = 0$, although variables which proxy for opportunity costs may affect choices.
 2. Availability of centre-based care (A_{DCC}) - a measure of the availability of day care in the particular region, measured as spaces per 1000 preschool children. Other types of paid child care are presumed to be perfectly elastically supplied. Availability of unpaid modes of care is dependent on the family situation and will be affected by variables such as ethnicity, whether a female relative lives in the household, etc
 3. Regulatory variables proxying child care quality.
 4. Demographic variables describing the particular child of interest, the other children in the family, and the demographic characteristics of the family (e.g., country of origin; widowed, separated, divorced, or never married for single parents, visible minority, age of mother, etc.)
 5. Education level of mother and spouse
 6. Expected after-tax hourly wage of mother
 7. Exogenous income or wealth
 8. For lone mothers, expected social assistance income
 9. Expected receipt of maternity/parental benefit
 10. Statutory length of maternity/parental leave

The Empirical Model

The main data source used is the 1988 *Canadian National Child Care Survey*, collected by Statistics Canada. There are about 14,000 families with children less than 6 years of age in this data set. Data from Cycles 1 and 2 of the *National Longitudinal Survey of Children and Youth* (a Statistics Canada longitudinal survey with about 23,000 families in total) is used to tune simulations from the model to current population totals. *Caring for A Living*, a 1991 survey of wages and benefits in about 500 child care centres across Canada is used to estimate the child care worker earnings regression.

Estimated parameters of employment choice variables and child care choice variables are key components of the empirical model. Consider a married mother with a preschool child. She makes an employment decision among four states: not employed, on maternity/parental leave, employed part-time (20 hours

per week), employed full-time (40 hours per week). This labour force decision (LF) depends on vectors of variables including the expected wage (W), taxes (T), other family income (Y), characteristics of children in the family (C), family characteristics (F), the expected prices of non-parental child care services (P), and policy variables not elsewhere included (Z) such as expected amount of maternity/parental benefit, and the statutory amount of leave available.

The employment decision of a lone (i.e, divorced, widowed, separated, never-married) mother is distinct only in the absence of variables relating to the father, in the presence of expected social assistance income (SA), and in differences in tax rates, etc.

For each individual mother "i", the following equation is estimated as a multinomial logit:

$$LF_i = f(W, T, Y, C, F, P, Z, SA) + \epsilon_i$$

Where the error term is assumed to represent random or unobserved preference variation and to be uncorrelated with any of the explanatory variables. Further, the error term is not correlated across choices (e.g., the unobserved preferences for part-time employment are uncorrelated with the unobserved preferences for full-time employment).

There are several variables unavailable in the data set being used which is the 1988 Canadian National Child Care Survey from Statistics Canada. The expected pre-tax wage is predicted from a sample selection corrected regression of hourly wages on worker characteristics from the sample of employed mothers with preschool children. Hourly wages of employed mothers are calculated by dividing annual employment income by reported hours and weeks of work.

The expected income taxes paid by a mother are calculated from a 1988 tax algorithm produced by the authors.

The expected prices of non-parental child care are predicted from regressions of hourly prices paid by users of each type of child care (DCC, OHNR, IHNR, REL, NSK) on geographical variables and variables associated with the probability of a below-market price being available for this particular child. The maintained hypothesis (see Chaplin et al., 1996 for a review of techniques used for predicting child care prices) is that prices of these types of child care are uniform for each child age across geographically-defined markets but that, for example, low-income families are eligible for a price which is below market rates. Including geographical variables (G), child age variables and number of children (in C), child care subsidy, grant and regulatory variables (GOV), and the availability of relatives in the household (in F), the general form of the child care price regressions can be written as:

$$P_i = g(G, C, GOV, F) + v_i$$

These prices are estimated using an OLS specification. In work so far, these regressions do not account for sample selection correction(see Chaplin et al., 1996).

The choice of child care mode is a decision made conditional upon the labour force decision. There are, as discussed above, potentially eight types of child care available. Five of these are “paid” types of child care (although for a particular family, they may be available at no cost), and three are types of care provided exclusively by parents. Not all types of care are available to all families. In particular, PAR is available only to those families in which the mother is not employed or is on maternity/parental leave.

The choice of child care mode refers to the choice of the primary form of child care used by the child. In cases where a child uses multiple modes of child care, we only model choice of the primary mode.

The choice of child care mode depends upon several vectors of variables, including: the expected price of various child care modes (P), the availability of licensed child care services (A), regulatory variables affecting quality (part of GOV), child characteristics (C), family characteristics (F), characteristics of the father’s and mother’s employment (E), and income variables (Y). Choice of child care mode is estimated as a multinomial logit. Several variables are unavailable or must be instrumented in order to avoid potential correlation between child care and employment decisions. In particular, child care prices (P) are predicted, as described above, and so are mother’s employment status (part of E) and mother’s employment income (part of Y).

The general form of the child care choice regressions is:

$$CC = h(P, A, GOV, C, F, E, Y) + \mu_i$$

where the error term represents unobserved utility from child care choice and is uncorrelated with the exogenous variables which determine child care choice and uncorrelated across child care choices. Child care choices may be structurally distinct for families with lone mothers and with married mothers, and for families in which the mother is not in the labour force.

V. The Simulation Model

The demand side of the simulation model consists of the estimated equations for employment choice and child care choice as described above. There are two employment choice equations, one for married mothers and one for lone mothers. There are three child care choice equations: one for employed married mothers, one for married mothers not in the labour force and one for lone mothers. Mother’s annual incomes are predicted on the basis of the predicted

employment choice. Child care expenditures are predicted based on predicted child care choice, employment choice and the price of child care. Taxes and the Canada Child Tax Benefit are predicted based on family income, child care expenditures and tax and benefit algorithms. For lone mother families, an algorithm calculates the amount of income provided by current Social Assistance programs.

The base population for the simulation model is the Canada-wide sample (excluding the Territories and aboriginal families on reserves) of approximately 15,000 families with preschool children from the 1988 Canadian National Child Care Survey.

The supply side of the simulation model consists of the supply of five types of child care: DCC, OHNR, IHNR, REL and NSK. In each case, we presume that the supply-price does not vary with the quantity supplied to the market. The simulation model predicts the supply-price of each type of care in each region. In the case of OHNR, IHNR, REL and NSK, prices are predicted using estimated parameters from the relevant child care mode price regressions.

In the case of licensed child care (DCC), a supply-price algorithm has been developed based on the typical cost structure of a 50-space day care centre. This algorithm takes as inputs the wage rates which are predicted from an earnings regression of child care centre workers wages on education level, narrowly defined occupation, experience, and other factors, including the average female provincial wage (see Cleveland and Hyatt, 2000). Provincial regulations on staff-child ratios, group size, and educational requirements for staff and supervisors determine the fixed-proportions production function for child care centre services. This algorithm predicts the supply-price of child care centre services, which will vary by child's age.

There are two other factors which affect the actual price paid by families for licensed child care services: operating grants provided by provincial or municipal governments and child care subsidies paid to low-income families. The problem with simulating the effect of operating grants is that it is not known to what extent these grants raise wages in child care centres and to what extent they lower the price of child care. The simulation model includes a switch whereby the user can choose alternative settings for the effect of operating grants.

An algorithm has been developed to represent the rules for eligibility for child care subsidy in different provinces and to calculate the amount of subsidy for which a family would be eligible.

Output variables

To allow the researcher to assess benefits and costs, or the tradeoffs involved in any policy decision, a wide range of outputs are reported on by the

model. Output variables include labour force participation and hours of work of mothers of preschool children for both single and attached mothers, type of care chosen for each child in the family, and the cost of care to government and to families.

- The following variables are reported on:
- ◆ the number of children using each type of care, by province, and by size of urban area
 - ◆ the number of families using each type of care, by province and by size of urban area
 - ◆ the number of children using each type of care, by marital status of parent(s), by employment status of mother, by age of child, by province, and by size of urban area
 - ◆ the number of families using each type of care, by marital status of parent(s), by employment status of mother, by province and by size of urban area
 - ◆ the average price, and availability of selected types of child care by province and size of urban area
 - ◆ the amount of private and public expenditures on child care, by marital and employment status of mothers, by province and by size of urban area
 - ◆ the change (from some base case amount) in the amount of private and public expenditures on child care, by marital and employment status of mothers, by province and by size of urban area
 - ◆ the values of key policy variables used in the latest simulation run, by province

VI. A Similar Model

The model described above has not yet been estimated. However, we have estimated the demand side of the model in simpler form for lone mothers with preschool children. This section of the paper describes this model and the next presents simulations based upon it to give a flavour of results which may be expected in the full model.

In order to estimate the impact of various policy levers, we estimate a simple bivariate probit model of the employment and child care choices of lone mother families. The model is similar to that estimated by Cleveland, Gunderson and Hyatt (1996) for married mothers and Cleveland and Hyatt (1996) for a different sample of lone mothers.

More formally, the following two equations are estimated:

$$E = X_e b_e + a_e PP + d_e W + g_e G + u_e$$

$$C = X_c b_c + a_c P + d_c W + u_c \quad \text{if } E = 1$$

Where:

E = one if the mother engages in paid employment and zero otherwise,
 X = a vector of determinants of the decision to engage in paid employment (when subscripted by “e”) and a vector of determinants of the decision to purchase market forms of care (when subscripted by “c”).

PP = the expected cost per hour of child care,

W = expected annual wage income of mother, if employed,

G = expected government income from social assistance,

P = the expected cost per hour of market child care,

U = error terms, bivariate normal with mean zero, variance one and covariance ρ .

Subscripts “e” and “c” refer to the employment choice decision and the child care choice decision respectively. a, b, d and g are parameters to be estimated.

We use data from The Canadian National Child Care Survey (CNCCS) to estimate this model. The CNCCS was collected by Statistics Canada as a supplement to the monthly Labour Force Survey in September and October of 1988. The survey had a larger sample and was more comprehensive than any survey of child care use and employment before or since. The sub-sample used in this article includes lone mother families with a preschool child (less than 6 years and not in school).⁽⁹⁾ The final sub-sample includes 831 lone mothers, of whom approximately 37% are employed. Of these, about 69% use market forms of child care.

Several of the key variables in our model are not directly available in our data set for all individuals in the sample. In particular, the expected wage if working is unavailable for the non-employed, the expected price of market care is unavailable for those not currently using it, and the expected amount of social assistance payments is not available for those not receiving it.

We estimate determinants of the annual earnings of employed lone mothers with an ordinary least squares regression on relevant dependent variables, and use this to project expected wages for all mothers in our sample. We use appropriate techniques to control for anticipated sample selection bias. The expected cost of market child care is determined based on a regression of hourly prices on relevant dependent variables, correcting for possible sample selection bias.⁽¹⁰⁾ We assume the cost of non-market care (care by relatives) is zero. The expected cost of child care faced by employed mothers is then calculated as the probability-weighted average of the expected costs of market

9 Observations were excluded for the following reasons: families in which either the work situation or the child care situation in the reference week was reported to be unusual; families in which the child is disabled; families in which the mother is on maternity leave; families in which the mother is not responsible for child care decisions; families in which the mother cared for her own child while working; and families for which the main child care arrangement was kindergarten.

10 These intermediate results are available from the authors on request.

care and non-market care. Details about the calculation of these probabilities are provided in Cleveland and Hyatt (1996).

Expected social assistance income is projected from regressions on families deemed to be receiving social assistance. This regression is corrected to account for the probability that those currently receiving social assistance are a select sample in ways that are unobserved by the researchers.

We have entered a number of other variables in the employment equation, in addition to the central policy levers of the costs of child care, mother's labor market wage, and social assistance. In the employment equation, these include mother's income from other sources (other than wages and government) a cubic of the mother's age, the composition of the family (i.e., numbers and ages of children in the family), the lone parent status of the mother (never married, divorced or separated), and regional dummy variables. In the market forms of child care equation, we include mother's income from other sources, whether the mother attended university (as a proxy for tastes for high quality child care), the presence of another female adult in the household (a potential care giver), ethnicity (to capture potential cultural differences in the use of market care), and regional variables.

Table 1 shows parameter estimates for the bivariate probit model of engaging in paid employment and purchasing a market form of child care. Both higher child care costs and higher social assistance income reduce the probability that a lone mother will be employed. Mothers with higher potential wages and those who are older (possibly with more job experience) are, as a result, more likely to be employed.

Results for the use of market forms of care equation reveal few statistically significant variables. The expected hourly cost of market care is statistically significant (at better than the 10 percent level in a one-tailed t-test), indicating that the probability of the use of market care diminishes as its price increases. Mother's expected labor market wage is not significant, nor are the other variables in the model. We interpret the lack of significance on the variables, other than the price of market care, as reflecting the reality that many lone mothers are constrained to using market forms of child care.

VII. Simulations

In this section, we consider a number of policy simulations that very broadly mimic the kinds of welfare and child care policy reforms that have either been implemented or actively contemplated across North America. We begin by developing a "base case", which mimics the stylized social assistance and child care subsidy schemes in Canada in 1988. Within the base case child care subsidy scheme, we examine the impact of a number of typical "welfare reforms". We then reexamine the same welfare reforms given a more generous than base

case child care subsidy environment.

The Base Case

In 1988, the year for which our model is estimated, average social assistance payments were lower than is currently the case. Although welfare rules vary from province to province in Canada, we can approximate the situation facing lone mothers by taking a typical case. For a typical single parent family with one child, full social assistance was approximately \$8,500 (National Council of Welfare, 1987; 1991). If the lone mother on welfare became employed, she could keep all of the first \$2,400 of employment earnings (the earnings disregard, or exemption). Any employment earnings above \$2,400 would be hers to keep as well, but welfare benefits would fall by \$0.75 for each \$1.00 increase in employment income until the lone mother was no longer eligible for welfare.

Naturally, for a lone mother, entering employment implies finding child care services. Some lone mothers have relatives available to provide care, but the majority do not. The average price of licensed child care in 1988 was about \$5,000 annually, but many lone mothers were eligible for provincially-provided child care subsidies. Subsidy rules vary across provinces, but as an approximation a typical lone mother would have to pay a minimum fee of \$1,000 annually, would be eligible for full subsidy of the remaining fees at any income level below \$12,000 annually, and would have child care subsidy reduced by \$0.50 for each additional \$1.00 of earnings beyond \$12,000 (a 50% benefit-reduction rate) (Special Committee on Child Care, 1987).

In shorthand form, this approximation to the existing subsidy system can be described as "M1250", where M refers to the \$1,000 minimum payment, 12 refers to the \$12,000 turning point, and 50 refers to the tax-back rate. After simulating a number of policy changes within this child care subsidy system, we compare the results of identical policy simulations with a "01525" subsidy system (i.e., zero minimum payment, \$15,000 as the turning point, and 25% as the tax-back, or benefit-reduction rate).

Simulating Welfare Reforms Under the Base Case Child Care Subsidy System

Our bivariate probit estimates of employment and child care decisions of lone-mother families permit us to simulate the likely responses of these families to changes in policy parameters. Past reforms and reform proposals have included the following types of policy changes:

- establishing a lifetime limit on the receipt of social assistance payments,
- compulsory work for welfare (workfare or training requirements),
- cuts to social assistance payments,
- increases in social assistance payments,
- wage supplements or increases in minimum wage,
- tax benefits for low-income earners conditional on employment,

- subsidized child care costs.

Over the last decade or so, different jurisdictions have tried different policies and combinations of these policies, with apparently sizable effects on social assistance receipt, employment patterns, and income inequality. Simulations can assist in sorting out which policies are producing which effects. It is not possible to directly simulate the first two types of policy reform with our model. A lifetime limit on social assistance is likely to have effects similar to a dramatic cut in social assistance payments (which we do calculate in simulation #1), but our model cannot simulate the short-run intertemporal substitutions that this policy might induce. However, we are able to calculate the probable effects of other types of policy reforms and combinations of them.

In Table 2, the following simulations are reported:

- (1) decrease social assistance income by 20% across the board,
- (2) increase social assistance income by 20% across the board,
- (3) increase wage income by 20% across the board,
- (4) cut social assistance by 20% and simultaneously increase wage income by 20%,
- (5) cut the cost of market child care by 50%,
- (6) combine each one of the above simulations with an improved child care subsidy system.

These simulations mimic policy changes which have been tried in various jurisdictions or have been recommended. In Canadian terms, the cut in social assistance is similar to that introduced in Ontario in 1996 and in Alberta in the late 1980's. The increase in social assistance is similar to that introduced in Ontario in the early 1990's. The increase in wage income mimics the effect of a universal wage supplement, or the Working Income Supplement to the Child Tax Benefit. The simultaneous decrease of social assistance and increase of wage income would have effects similar in spirit to that of the federal increase in the Child Tax Benefit conditional on employment in the late 1990's combined with simultaneous negotiated cuts in eligibility for provincial/territorial social assistance. The fifth simulation – cut of 50% in the cost of child care – is similar in spirit to the recent child care reforms in Quebec, where licensed child care services are available for \$5.00 per day to all families. The final set of simulations (bottom half of Table 2) combine recommended changes to the child care subsidy system similar to those that we have advocated elsewhere (Cleveland and Hyatt, 1998) with each of the previous reforms.

It is obvious from the simulations in Table 2 that the employment behavior of lone mothers with preschool children is sensitive to changes in policy parameters. In the base case, about 37% of these lone mothers are employed (although we do not explicitly simulate participation in social assistance, most of

the remainder would be eligible for and would collect social assistance payments). Most employed lone mothers with preschool children use market forms of child care (about 69% of employed lone mothers with preschool children). The average income of these employed mothers is just slightly over \$22,000 annually (note that incomes of the employed may include social assistance, eligibility for which declines as employment income rises). The lone mothers who are not employed rely mainly on social assistance; their average income is about \$7,700 annually. The weighted average income, combining employed and not employed mothers, is just over \$12,000.

A cut in welfare payments of 20% would make staying at home with children less attractive and less feasible for many lone mothers. The number employed is projected to increase by nearly 11 percentage points. The proportion using market child care would rise in proportion with employment (staying at about 70% of all such families), and the average income of those employed would fall to about \$19,500. The fall in average employment income is a natural consequence of the entry into the labor force of many lone mothers whose expected wage was previously too low to encourage labor force participation, but is now preferable to the lower social assistance benefits. The cut in social assistance payments would lower incomes of those staying on social assistance; their average income is projected to fall by about \$1,500 annually, to slightly more than \$6,100.

An increase in welfare payments of 20% encourages lone mothers to stay at home and collect welfare rather than be employed. The employment rate falls by about 10 percentage points relative to the base case, and use of market care falls approximately proportionately, to about 68% of all employed lone mother families. The average wage of employed lone mothers rises (to over \$26,400), as mothers with low expected wages leave the labor force. The higher welfare payments would raise incomes of the not employed by nearly \$1,500. However, because fewer mothers would be employed, the weighted average income of all lone mothers falls, by nearly \$700 annually, relative to the base case.

An increase of 20% in the gross wage (e.g., through a wage supplement) has a positive effect on employment. Employment increases relative to the base case, but only moderately (less than 2 percentage points). The relatively modest effect of increased wages results from high benefit-reduction rates under social assistance rules. As a result of increased wages and greater employment, more mothers choose market care (about 73%). The biggest effect is, naturally, on the average incomes of those who are employed. Average incomes are over \$1,800 higher than in the base case, due to the rise in wages, but moderated by a decrease in social assistance eligibility of the employed. Incomes of those who are not employed are essentially unaffected, so the weighted average income rises by nearly \$1,000 relative to the base case.

The combination of lower social assistance payments and tax benefits

conditional upon employment can be represented by simulation #5 – a 20% cut in welfare payments and a 20% increase in the wage. The cut in welfare payments makes employment relatively more attractive, as does the supplement to wages. Relative to the base case, employment rises by over 12 percentage points, while the use of market care rises more than in proportion, to 73.5% of all employed lone mothers). Average incomes of the employed is over \$1,300 lower than in the base case. The leavening effect of the wage supplement is more than offset by the influx into employment of mothers with lower expected wages than incumbent workers. Of course, those still on welfare suffer a cut in benefits of over \$1,500. Because so many lone mothers are encouraged into employment where incomes are higher than social assistance, the weighted average income of all lone mothers is close to \$1,700 higher than in the base case.(11)

The final simulation based on the M1250 child care subsidy system shows the effect of a 50% cut in child care costs, relative to base case values. Child care costs are obviously an important barrier to employment for lone mothers of preschool children. The additional subsidization of child care costs increases employment participation by 9 percentage points, relative to the base case, and an increase in the use of market child care to over 81% of all employed lone mother families with preschool children. Average incomes of the employed fall (by about \$2,000 annually) as mothers with lower expected wages enter the labor force. Social assistance is largely unaffected, and the weighted average income of all lone mothers rises by nearly \$1,500.

What are we to conclude from this first set of simulations of the effects of alternative types of welfare reforms. First of all, it is obvious that policy matters – changes in policy have perceptible impacts on employment and child care decisions, and on family incomes. Second, cuts in social assistance payments on their own will drive lone mothers off social assistance and into employment, but at considerable cost to the incomes (and presumably well-being) of those families, including the children. Third, increased social assistance payments are not a solution to employment or income problems, in general. The negative effect of these increased payments on work incentives will leave the average lone mother family worse off than before, and will cut the number of children involved in organized early childhood care experiences. Fourth, wage supplements (unless they are exempt from benefit reduction provisions of social assistance programs) will only modestly reduce welfare dependence and encourage employment experiences, although they have a positive impact on average incomes. Fifth, a combination of reduced social assistance payments and enhanced wages will encourage employment, raise average incomes, and

11 Both the Earned Income Tax Credit in the United States and the supplement to the Canada Child Tax Benefit are employment-conditioned benefits that are designed so as not to reduce social assistance eligibility of recipients. In other words, these types of wage enhancement are made part of the earnings disregard. To the extent that welfare authorities do not correspondingly reduce social assistance benefits, this type of wage enhancement would be expected to have a larger positive effect on employment than shown in our projection.

increase the number of children participating in organized early childhood care. Sixth, employment and child care decisions are also sensitive to the cost of child care; this is a relatively neglected aspect of recent welfare reforms.

Simulating Welfare Reforms Under a More Generous Child Care Subsidy System

The second half of Table 2 presents all of the above simulations over again, but with a more generous child care subsidy rule – “01525” (i.e., zero minimum payment, \$15,000 as the turning point, and 25% as the tax-back, or benefit-reduction rate) instead of “M1250”.⁽¹²⁾ This subsidy system would make more lone mothers eligible for full subsidy, more lone mothers eligible for partial subsidy, and it would reduce the annual child care costs for those currently receiving “full” subsidy. These simulations are designed to indicate how child care policy matters to welfare reform. We conclude that a combination of welfare reforms and child care reforms is likely to produce better results than welfare reforms on their own.

The general effect of this enhanced child care subsidy on all six simulations is to substantially increase the positive employment effects of any policy. Naturally, too, in each case the use of market child care is enhanced. The average income of employed lone mothers is lower than in the previous set of simulations because of the encouragement into the labor force of those with lower expected wages. Social assistance incomes are essentially unaffected. Across all lone mothers, however, the weighted average income is higher than in the previous group of simulations.

These simulations clearly invite the conclusion that child care policy does matter. First, more generous subsidy systems encourage the use of market (i.e., more formal forms of) child care. Second, while the pattern of employment effects in this second set of simulations is similar to the first, the base level of employment is considerably higher. In other words, the more generous child care subsidy program effectively results in a shift upward of employment probabilities in each of the welfare program simulations. The only simulation that diverges somewhat from the pattern of employment effects observed under the less generous M1250 child care subsidy environment is the 50 percent reduction in child care price. This is due to the fact that because child care costs for most lone mother families have already been reduced by the 01525 subsidy system, the cut in child care price affects only higher income lone mothers.

Also worthy of particular note is the effect of the 01525 subsidy system on both average employed income and the average income of all lone mothers. For every simulation in the more generous subsidy environment, the average income of employed mothers is lower than under the M1250 subsidy system. This effect,

¹² Reflecting inflation, changes in incomes, and changes in policy rules since 1988, the current subsidy system in Canada is better approximated by “M1560”. In work elsewhere, we have recommended the alternative subsidy rule of “01925” (Cleveland and Hyatt, 1998).

which at first blush appears to be negative, is simply reflecting the entry of mothers with lower potential labor market incomes into employment in response to the further subsidization of their child care costs. A truer indication of the overall effects of child care subsidies on lone mother incomes is found in the “Weighted Average Income” column of Table 2, which shows that, for every simulation, the average income all lone mother households is substantially higher (usually more than \$1,800 higher) than for the corresponding simulations under the M1250 program. This is because more lone mothers are employed, and earning a labour market wage that is significantly higher than income from social assistance.

VIII. Concluding Remarks

Work is continuing on the full simulation model of child care and employment choice.

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Table 1
Bivariate Probit Estimates of the Probabilities
of Employment and Use of Market Forms of Care by Lone Mothers

| Independent Variables | Employment | | Market Forms of Care | |
|---|--------------------|-------------|----------------------|-------------|
| | Probit Coefficient | t-Statistic | Probit Coefficient | t-Statistic |
| Expected cost of child care (\$/hr) | -0.779 | -3.60 | | |
| Expected cost of market care (\$/hr) | | | -0.435 | 1.45 |
| Mother's expected wage (\$1,000/yr) | 0.026 | 3.03 | 0.025 | 0.90 |
| Mother's expected social assistance income (\$1,000/yr) | -0.225 | -2.72 | | |
| Mother's income from other sources (\$1000/yr) | 0.028 | 0.85 | 0.353 | -0.22 |
| Mother attended university | | | -0.477 | -0.65 |
| Mother's age | 0.976 | 2.24 | | |
| Mother's age squared | -0.023 | -1.77 | | |
| Mother's age cubed | 0.0002 | 1.36 | | |
| Presence of child 10-18 years of age in household | | | | |
| Presence of female adult in household | | | -0.430 | -0.79 |
| Ethnicity of Mother [Canadian born] | | | | |
| Not Cdn born/English speaking (French speaking in Quebec) | | | 0.423 | 0.98 |
| Not Cdn born/not English speaking (not French speaking in Quebec) | | | 0.353 | 0.96 |
| Family Composition [One child < 6 years old] | | | | |
| More than 1 child < 6 years old | 3.5794 | 0.10 | | |
| Some < 6; some 6-10 years old | 0.497 | 2.53 | | |
| Some < 6; some 11-18 years old | 0.756 | 3.21 | | |
| Lone Parent Status [Never married] | | | | |
| Divorced | 0.213 | 1.65 | | |
| Widowed | -0.019 | -0.10 | | |
| Region [Manitoba, Saskatchewan, Alberta] | | | | |
| Atlantic | -1.058 | -3.61 | -0.497 | -1.23 |
| Quebec | -0.408 | -2.49 | -0.287 | -0.69 |
| Ontario | -0.408 | -2.59 | -0.009 | -0.03 |
| British Columbia | -0.681 | -2.82 | -0.865 | -1.67 |
| Constant | -11.509 | -2.42 | 0.916 | 0.775 |

Notes: 1) The estimated correlation coefficient of the errors in the employment and market care equations is 0.047 with an associated t-statistic of -0.11.

2) Omitted reference categories are given in square brackets.

Table 2
Simulations of the Effects of Welfare Reforms, with Current and Alternative
Child Care Subsidy Systems

| Simulation | Employed (%) | Using Market Child Care (% Of Employed) | Average Employed Income | Average Non-Employed Income | Weighted Average Income |
|---|--------------|---|-------------------------|-----------------------------|-------------------------|
| Simulations based on current (base) child care subsidy system (M1250) | | | | | |
| 1. Control case | 36.8 | 69.1 | \$22,011 | \$7,658 | \$12,016 |
| 2. Cut welfare 20% | 47.7 | 70.3 | \$19,457 | \$6,111 | \$12,735 |
| 3. Increase welfare 20% | 26.9 | 68.1 | \$26,437 | \$9,125 | \$11,350 |
| 4. Increase wage 20% | 38.4 | 72.8 | \$23,819 | \$7,671 | \$12,975 |
| 5. Cut welfare 20% and increase wage 20% | 49.3 | 73.5 | \$20,642 | \$6,100 | \$13,679 |
| 6. Cut child care cost 50% | 45.8 | 81.1 | \$20,025 | \$7,694 | \$13,490 |
| Simulations based on alternative child care subsidy system (01525) | | | | | |
| 1. Control case | 52.0 | 83.2 | \$18,937 | \$7,697 | \$13,949 |
| 2. Cut welfare 20% | 62.5 | 83.3 | \$18,052 | \$6,149 | \$14,541 |
| 3. Increase welfare 20% | 41.3 | 84.0 | \$19,247 | \$9,297 | \$13,205 |
| 4. Increase wage 20% | 54.2 | 85.3 | \$19,742 | \$7,703 | \$14,803 |
| 5. Cut welfare 20% and increase wage 20% | 64.5 | 85.2 | \$19,028 | \$6,144 | \$15,567 |
| 6. Cut child care cost 50% | 55.1 | 86.4 | \$19,257 | \$7,688 | \$14,477 |

Note: The top panel shows simulation results under the then-(1988) current rules for eligibility for child care subsidy (M1250), in which each family pays a co-payment of \$1,000 annually, the turning point for the end of full subsidy eligibility occurs at \$12,000, and the benefit-reduction rate is 50% above that income level. The bottom panel shows simulation results under an alternative child care subsidy system, denoted as 01525, because there is zero co-payment, the turning point occurs at \$15,000, and the benefit-reduction rate is 25% on income above that income level.