**AN ASSESSMENT OF THE IMPACT OF THE NATIONAL CHILD BENEFIT ON FAMILIES
ON SOCIAL ASSISTANCE**

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# ASSESSMENT OF THE IMPACT OF THE NATIONAL CHILD BENEFIT ON FAMILIES ON SOCIAL ASSISTANCE

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The National Child Benefit (NCB) is a joint initiative of Canada's federal, provincial, and territorial governments that provides cash and in-kind benefits to families with children. It was launched in 1998 with two main objectives: to prevent and reduce the depth of child poverty and to promote work attachment.

While a formal evaluation has recently begun, no results are yet available. This paper focuses on the evaluation of one specific aspect: the impact of the NCB on the integration of social assistance recipients to the labour market. This evaluation is carried out using an econometric technique. Four regression equations are estimated for social assistance recipients using three explanatory variables—the unemployment rate, the lagged dependent variable and a dummy variable. Each regression equation is estimated for a family type –single persons, couples without children, couples with children and single parents. The regression equations are estimated for Canada, using provincial data—aggregated on the national level.

The dummy variable is used in the specification of the regression equations to detect the behavioral change for each family type; the results reveal a significant structural change starting in 1999: an increasing number of families with children leaving social assistance. However, this was not the case for families without children. This suggests that a program related to children may be responsible for this difference in the exit rate between two family groups. While the impact of provincial regulations and workfare programs on social assistance recipients cannot be ruled out, it is reasonable to assume that the NCB could be a contributing factor to the increase in the number of families with children leaving social assistance since 1999.

La Prestation nationale pour enfants (PNE) est un partenariat entre les gouvernements fédéral, provinciaux et territoriaux qui fournissent de l'aide financière et des services directs aux familles avec les enfants. Elle a été mise sur pied en 1998 avec deux objectifs principaux : aider à réduire l'étendue de la pauvreté chez les enfants et favoriser la participation au marché du travail.

Une évaluation formelle de l'ensemble du programme a récemment été entreprise mais aucun résultat définitif n'est disponible pour le moment. Cette étude vise à évaluer un aspect particulier seulement, soit l'impact de la PNE sur l'intégration au marché du travail des assistés sociaux. En d'autres termes, est-ce que la PNE a encouragé les familles avec les enfants qui bénéficient de l'aide sociale à réintégrer sur le marché du travail? Les données utilisées sont des données administratives provinciales portant sur le nombre de bénéficiaires de l'aide sociale, par type de famille, agrégés au niveau national.

En utilisant des variables auxiliaires imposées aux fonctions spécifiées pour chaque type de famille, les résultats démontrent qu'un changement structurel significatif s'est produit en 1999 dans le mouvement des familles avec enfants de l'aide sociale vers le travail. Ceci n'est cependant pas le cas pour les familles sans enfants. Bien que d' autres changements structurels ne puissent être écartés, ces résultats suggèrent que la PNE a probablement été un facteur contribuant à l'augmentation du nombre de familles avec enfants qui ont quittées l'aide sociale depuis 1999.

I. INTRODUCTION

The National Child Benefit (NCB) provides an income benefit to low-income families with children who are receiving the Canada Child Tax Benefit (CCTB). It was launched in 1998 with two main objectives: 1) to prevent and reduce the depth of child poverty among low- income working families, and 2) to promote work attachment of low-income families with children, especially those on social assistance. The work attachment is achieved by lowering the welfare wall through financial initiatives of the NCB. The welfare wall refers to a loss of welfare-related benefits when a family moves from welfare to work (Canada, 2001).

Although no formal evaluation of the impact of the NCB on low-income families with children has yet been carried out, it is generally believed based on its design that the NCB is one of the few social programs which does not impede employment and economic growth. On the contrary, its most striking feature is that it prevents exclusion and promotes inclusion. That is, it encourages participation of low-income families with children in the economy and in community by preventing and reducing child poverty and encouraging work attachment. The NCB is designed in principle to reward welfare families with children who seek employment rather than those who stay on social assistance. Financial benefits provided under the NCB to a working family make leisure more expensive and the work more rewarding, thus providing an incentive to work. While the design appears to be theoretically sound, it is important to measure its real impact on low-income families with children, especially those on social assistance.

The evaluation of the first objective requires the measurement of the impact of the NCB initiatives on the incidence and depth of low-income on working families with children. The evaluation of the second objective could be carried out in several ways. One of them, which is used here, is to determine the number of families with children who moved away from social assistance to employment as a result of the NCB.

The objective of this paper is to describe an econometric approach developed to evaluate the second objective of the NCB. The paper is divided into six sections. Section II explains the methodology developed to estimate the number of social assistance families with children who left social assistance to work due to the NCB. Section III describes the data used in the estimation of the regression equations. The estimation procedure is discussed in Section IV. In Section V, the results obtained from the estimation are summarized. The conclusions are presented in the final section.


II. METHODOLOGY

The methodology used to estimate the number of social assistance families with children who moved away from social assistance to work as a result of financial initiatives of the NCB is described in this Section. At the outset, it is important to note that this methodology has some shortcomings. For example, some low-income families who may have stayed in employment due to the financial incentives of the NCB are not taken into account in the calculations, as these families were not on social assistance. This implies that the methodology may underestimate the impact of the NCB in reducing the number of social assistance families. The methodology has another shortcoming: it does not provide separate data on the decline in the number of families with children who moved to work due, in absolute terms, to provincial regulations including workfare programs or due to the NCB. However, workfare in Ontario started well before 1998, that is, well before the launching of the NCB. It is, therefore, reasonable to assume that an extra decline in the number of families with children presented in Figure 1 and 2 extracted from Table 1, as compared with families without children after1998, is perhaps due to the NCB. Then, the aim of the methodology is to show that the decline in the number of families with children is significantly different from the decline in the number of families without

**Figure 1: Percentage Change in Social Assistance Caseloads**
**(Single Parent versus unattached Individuals)**
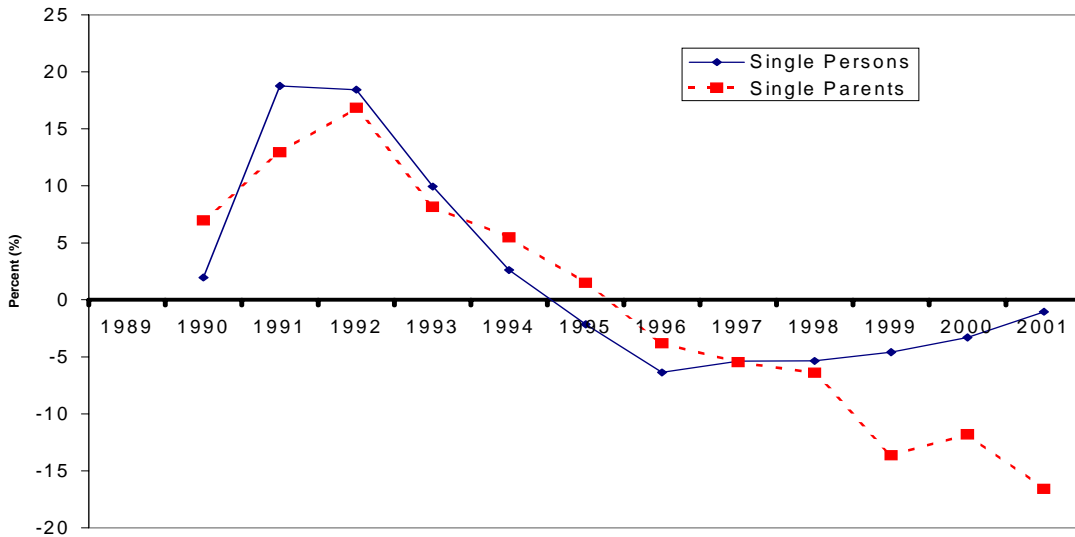


Source: Table 1

**Figure 2: Percentage Change in Social Assistance Caseloads**
**(Couples with Children and without Children)**
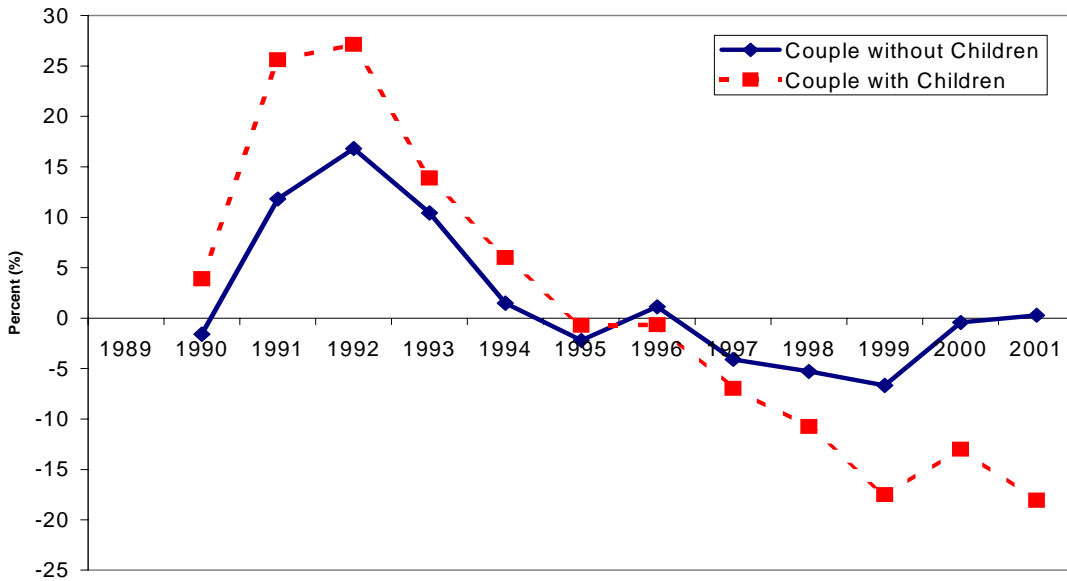


Source: Table 1

children, on social assistance. This objective is achieved by estimating four regression equations one for each family type by using three independent variables. These variables are-- the lagged dependent variable, the unemployment rate and a dummy variable. The lagged dependent variable is used as an explanatory variable to reflect the behavioral association of social assistance recipients with the previous period.  This variable, to some extent, takes care of the change in the number of social assistance recipients due to provincial regulations including the workfare.

The use of the unemployment rate as an explanatory variable to estimate social assistance cases is certainly appropriate, as it represents cyclical economic conditions which may have caused the number of families on social assistance to change.  It is expected that the number of social assistance beneficiaries to vary with the rate of unemployment. That is, when the unemployment rate starts to rise the number of persons on social assistance starts to increase. And when the rate of unemployment starts to decline, the number of persons on social assistance decreases. However, the unemployment rate affects social assistance recipients with a lag. It is because to qualify for social assistance one has to first exhaust Employment Insurance benefits and some part of accumulated savings.  The dummy explanatory variable is used to capture the shift in the number of social assistance recipients after 1998.

The methodology used here is based on the following assumptions. First, it is hypothesized that if the NCB has a positive impact on work force attachment for families with children, then the number of social assistance beneficiaries—families with children remaining on social assistance after 1998 – would decline. This decline would be larger than the pre-NCB trend would indicate (Gupta, 2001). This implies that the NCB would cause a shift from the historical trend in the pattern of social assistance families with children.  This shift could be measured or identified by using a dummy variable. Generally, in econometrics, a dummy variable is used when there is a shift in data due to war or other qualitative factor.

Further, it is assumed that the reason for the total decline in the number of families on social assistance could be twofold:

- A decline due to a general trend that started in 1994, before the NCB, as a result of improvements in economic conditions in the country and tightening of provincial eligibility rules, and
- the decline due to the NCB, mainly in the number of social assistance families with children, that began in 1998.

To test the stated hypothesis, an econometric model is specified and estimated for each social assistance recipient category.  Each regression equation is estimated using three independent explanatory variables. These independent variables which are already described above are the lagged dependent variable, the lagged unemployment rate and a dummy variable. The dummy variable has a value of 1 from 1999 to 2001 and 0 for other years.

To estimate this model, all social assistance recipients are divided into five categories: single persons, couples without children, couples with children, single parents and children.  The regression equations are estimated for only four categories or family types as children are not expected to be in the labour force.  These are: single persons, couples without children, couples with children and single parent families.

Although the first two categories are not affected by the NCB, the regression equations are estimated for these categories in order to validate the model.  The other regression equations are estimated for couples with children and single parent families as they are the principal beneficiaries of the NCB and, as such, they are impacted by the NCB. Prior to estimation, all social assistance recipients in each category were standardized. This standardization is achieved by dividing social assistance recipients by the corresponding labor force.  The ratio of social assistance recipients to labor force is measured as a number per thousand.  The general form of the equations is described below.

**General Form of the Equations**

$SAR(t) = f(SAR(t-1), URATE (t-1), DUM(t))$

That is:

$SAR (t) = K + a SAR (t-1) + b URATE (t-1) + c DUM(t) + e$………..(1)

$SAR (t) = K + a SAR (t-1) + b URATE (t-1) + e$…………(2)   (excluding dummy variable)

Where:

SAR =         Social Assistance Recipients standardized by Labour Force
K     =         Constant (intercept)
URATE =  Unemployment Rate
DUM =      Dummy variable
(e )     =      Error  Term
(a, b, c ) =  Estimated Coefficients
(t)          = time subscript

## III. DATA

Time series data on social assistance recipients are obtained from the Quantitative and Information Analysis Division of the Social Policy Branch of the Department of Human Resources Development Canada. The data are abstracted from the administrative files received from the provincial and territorial governments on a monthly basis. The data by family status are only available for the month of March for each year for all provinces and territories. The total social assistance data are divided into five categories—single persons, couples without children, couples with children, single parents and children. Single persons are used in the estimation. For example, two persons are used instead of a couple. All data used in the estimation are compiled from March 1989 to March 2001.  Social assistance recipient data along with unemployment rate and labour force data are provided in Table 1. The labour force numbers and unemployment rate data are for the month of March for each year.  The data on unemployment rate and on labor force are taken from Statistics Canada's publication "Historical Labour Force Statistics", Statistics Canada, Cat. No. 71-201-XPB. The dummy variable is constructed using a value of 1 for the years 1999 to 2001 and 0 for all other years.

**TABLE I**

**Social Assistance cases by type of family status (1) and Labor Force Statistics**

| Year | Single Persons | | Couples Without Children | | Couples with Children | | Single Parents | | Unemployment Rate (%) | Labor Force (000) |
|------|-------------|----------|-------------|----------|-------------|----------|-------------|----------|-------|-------|
| | Number (#) | % Change | Number (#) | % Change | Number (#) | % Change | Number (#) | % Change | | |
| 1989 | 586300 | | 113400 | | 179600 | | 289300 | | 8.6 | 13858.4 |
| 1990 | 597800 | 1.96 | 111600 | -1.59 | 186600 | 3.9 | 309400 | 6.9 | 8.2 | 13960.2 |
| 1991 | 710000 | 18.77 | 124800 | 11.83 | 234400 | 25.62 | 349400 | 12.9 | 11.7 | 14162 |
| 1992 | 840900 | 18.44 | 145800 | 16.83 | 298000 | 27.13 | 408200 | 16.8 | 12.2 | 14172.8 |
| 1993 | 924500 | 9.94 | 161000 | 10.43 | 339400 | 13.89 | 441500 | 8.2 | 12.4 | 14313.9 |
| 1994 | 948700 | 2.62 | 163400 | 1.49 | 359800 | 6.01 | 465600 | 5.5 | 11.7 | 14348.4 |
| 1995 | 928300 | -2.15 | 159800 | -2.2 | 357200 | –0.72 | 472500 | 1.5 | 10.6 | 14594.3 |
| 1996 | 869300 | -6.36 | 161600 | 1.13 | 354800 | –0.67 | 454500 | -3.8 | 10.4 | 14636.1 |
| 1997 | 822600 | -5.37 | 155000 | -4.08 | 330100 | -6.96 | 429600 | -5.5 | 10.0 | 14817.0 |
| 1998 | 778600 | -5.35 | 146800 | -5.29 | 294600 | -10.75 | 402100 | -6.4 | 9.0 | 15092.6 |
| 1999 | 742900 | -4.59 | 137000 | -6.68 | 243000 | -17.52 | 347300 | -13.6 | 8.4 | 15394.8 |
| 2000 | 718400 | -3.3 | 136400 | -0.44 | 211400 | -13 | 306300 | -11.8 | 7.3 | 15691.9 |
| 2001 | 710900 | -1.04 | 136800 | 0.29 | 173200 | -18.35 | 255500 | -16.59 | 7.6 | 15976.0 |

(1) Social Assistance Data as of March 1989 to March 2001

Source: Quantitative Information Analysis Division, Social Policy, HRDC, June 2001 (unpublished)
 Historical Labour Force Statistics, Statistics Canada, Cat. No. 71-201-XPB

## IV. ESTIMATION

Using "STATA" Statistical/Data Analysis program package, several regression equations for the standardized social assistance recipients were estimated. Four different regression equations for four family types were estimated using the lagged dependent variable, the lagged unemployment rate and a dummy variable as independent explanatory variables. The Ordinary Least Squares method was used in the estimation. The estimation period was 1990 to 2001. The same four equations were also estimated using only two independent explanatory variables, that is, without the dummy variable. The first four equations are presented below. The other four equations without the dummy variable are presented in the Appendix. However, these are used in estimation of the number of social assistance recipients in all four categories. This is done to isolate the effect of the dummy variable. The estimated numbers of social assistance recipients---with and without dummy--- are presented in Table 2.

It is usual in estimation procedure to estimate as many specifications as possible in order to find one that seems most reasonable. Thus, various specifications with different explanatory variables and lag structures were estimated. Only successful specifications which are relevant and are statistically sound are chosen. An alternate set of equations is also estimated here to estimate the number of social assistance recipients in the same four categories as above. This is done by using the unemployment rate, the time trend variable and the dummy variable as independent explanatory variables to show that the dummy variable is also significant in this alternate specification. These equations are presented in the Appendix.

The first set of estimated equations are presented below.

$$\text{RCWK (t)} = -2.6017 + 0.4372 \text{ RCWK (t-1)} + 1.3917 \text{ URATE (t-1)} - 2.5994 \text{ DUM (t)} \dots\dots(1)$$

$$(-0.92) \quad\quad (3.99) \quad\quad\quad\quad (3.93) \quad\quad\quad\quad (-2.56)$$

Adj. R-squared = 0.95     DW = 2.31 (Durbin-h = -0.56)     RMSE = 1.1725

Estimation Period 1990 – 2001

$$\text{RSP(t)} = 2.4702 + 0.4269 \text{ RSP (t-1)} + 1.3369 \text{ URATE (t-1)} -3.9002 \text{ DUM(t)} \dots\dots\dots(2)$$

$$(0.99) \quad\quad (4.19) \quad\quad\quad (4.36) \quad\quad\quad\quad (-4.54)$$

Adj. R- squared = 0.97     DW = 2.14 (Durbin-h = -0.26)   RMSE = 1.0003

Estimation Period 1990 to 2001

$$\text{RSING (t)} = 6.8215 + 0.2421 \text{ RSING (t-1)} + 3.4419 \text{ URATE(-1)} - 0.7330 \text{ DUM(t)} \dots\dots(3)$$

$$(1.01) \quad (1.46) \quad\quad\quad\quad (3.56) \quad\quad\quad\quad (-0.30)$$

Adj. R-squared =0.89     DW = 1.96  (Durbin-h = -0.08)     RMSE = 2.7352

Estimation Period 1990 to 2001

$$\text{RCNOK (t)} = 1.9209 + 0.3527 \text{ RCNOK (t-1)} + 0.4462 \text{ URATE (t-1)} - 0.0884 \text{ DUM (t)} \dots\dots(4)$$

(1.66)    (2.40)                    (3.48)                    (- 0.24)


Adj. R-squared = 0.88   DW = 1.9  (Durbin-h = -0.2)   RMSE= 0.42044

Estimation Period  1990 to 2001


Where:

RCWK = Ratio of Couple with kids on Social Assistance to Labor Force  (Standardized)

RSP = Ratio of Single Parents on Social Assistance to Labor Force

RSING = Ratio of Single Persons on Social Assistance to Labor Force

RCNOK = Ratio of Couple with no Kids on Social Assistance to Labor Force

URATE = Unemployment Rate

DUM = Dummy Variable

(t )  = Time Subscript


The first regression equation estimates the number of standardized couples with children on social assistance by using three independent explanatory variables-- lagged couples with children (lagged by one year), the unemployment rate lagged by one year, and the dummy variable.  The equation is a good fit as all coefficients are statistically significant at least at 5% significance level.  The t- values for all estimated coefficients are larger than 2.5 except the intercept or constant term.  The adjusted R-squared is 0.95, which is very high, and the Durbin-h statistic which is required in the case of a lagged dependent variable is good, less than 1.645 which does not indicate any auto-correlation problem. Durbin-h statistics is calculated here as described by Johnston and Di Nardo (1997, pp 182-183).

Since the object of this paper is to evaluate the impact of the NCB on workforce attachment of families with children on social assistance, it is important to show that the coefficient of the dummy variable is statistically significant and the sign of the estimated coefficient is negative.  If these two conditions are met, then the NCB appears to have an apparent positive impact on families with children on social assistance. That is, the NCB has presumably encouraged couples with children to move from social assistance to the world of work.  Equation (1) confirms this. This implies that there has been a structural change in the behavior of social assistance recipients—couples with children—since the implementation of the NCB in 1998.

Another important point to note from Equation (1) is the role of the lagged unemployment rate variable. The plus sign of the coefficient suggests a positive relationship between couples with kids on social assistance and the lagged unemployment rate. This relationship is also valid for all social assistance family groups. This relationship states that first, the unemployment rate rises and with it, after a lag of a year, rises the number of families on social assistance.  The interpretation of it, is that first unemployed persons exhaust their unemployment benefits and perhaps their savings before they move to social assistance.  Equation (1) suggests that if an additional 100 persons were unemployed that will result in an increase of 14 persons on social assistance.

The lagged dependent variable states that the number of persons in the current year is dependent on the number in the previous year.  In a way, this reflects conditions such as provincial regulations and habits existed in the previous year. The estimated coefficient of the lagged dependent variable states that an addition of 100 persons on social assistance in the previous period results in an extra 44 persons who remain on social assistance.

The interpretation of the second equation is similar to that of the first equation. The coefficient of the dummy variable in Equation (2) is highly significant and the sign of the coefficient is negative, which confirms that the NCB has impacted the behavior of single parents on social assistance. That is, there has been a decline in the number of single parents on social assistance, since the implementation of the NCB. The magnitudes of the estimated coefficients are slightly different in Equation (2) compared with Equation (1). But, the results remained the same.

Equation (2) was re-estimated using the female unemployment rate replacing the common unemployment rate. The estimated coefficients were different in magnitude but there was no real change in general direction. The estimated coefficient of the independent variable, the female unemployment rate was 1.87 which is larger than the estimated coefficient 1.34 of the same variable with the common unemployment rate suggesting a larger influence of the female unemployment rate on single parents on social assistance. The estimated equation is presented in the Appendix.

Equation (3) shows that the coefficient of the dummy variable is statistically insignificant, which indicates (according to the stated theory) that there is no impact of the NCB on single persons on social assistance. This is in line with the proposed theory and with the mandate of the NCB. There are two important messages coming out from Equation (3): first, the rise in unemployment affects single persons more than any other group on social assistance, as with every additional 100 single persons unemployed there is an increase of 34 persons on social assistance. Second, single persons on social assistance are least associated with the number of single persons on social assistance in the previous year.

Equation (4) shows that the coefficient of the dummy variable is insignificant, like in Equation (3). This implies that the NCB has no impact on couples without children on social assistance. However, the number of couples without children on social assistance is affected by the unemployment rate, but it is less impacted than single persons. That is, their number on social assistance does not increase as much as in the case of single persons, as the estimated coefficient of the unemployment rate in Equation (4) is less than 1-- close to 0.45.

Table 2 provides the observed and the estimated number of social assistance recipients in all four categories: single persons, couple with children and without children and single parents. These numbers are estimated using the estimated equations presented above with dummy independent variable and without the dummy variable. Table 2 shows the larger residuals between the observed number of social assistance recipients and the estimated numbers estimated without the dummy variable for the years 1999 and 2001 in two categories of social assistance recipients—couples with children and single parents. However, these similar larger deviations are not found for couples without children and single persons on social assistance. This entire phenomenon may be due to the effect of the NCB since 1998. The estimated equations without the dummy variable are presented in the Appendix. Some of these equations are not sound statistically.
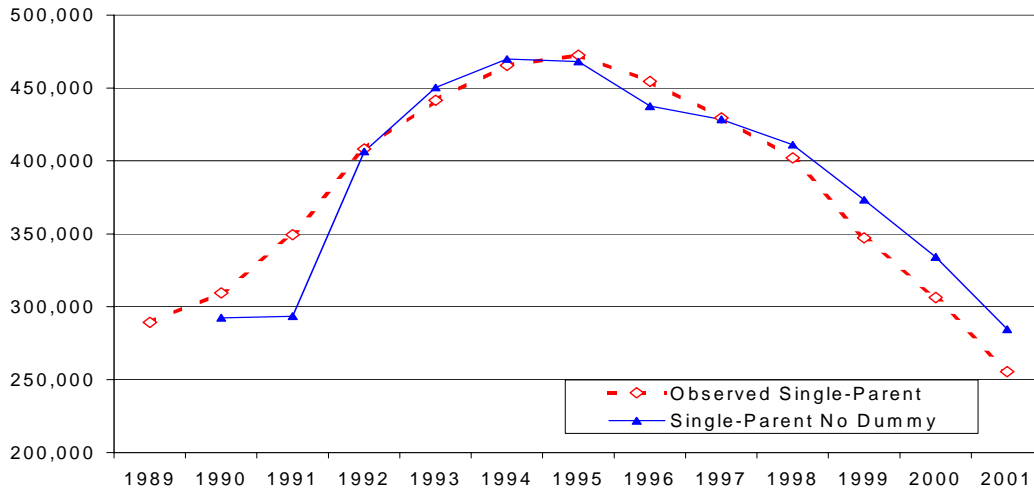
# TABLE 2

**Number of persons on Social Assistance Observed and Estimated with and without Dummy Variable**

| Year | Single Persons | | | Couples with Children | | | Single Parents | | | Couples without Children | | |
|------|----------|---------------------------|------------------------------|----------|---------------------------|------------------------------|----------|---------------------------|------------------------------|----------|---------------------------|------------------------------|
| | Observed | Estimated with Dummy | Estimated without Dummy | Observed | Estimated with Dummy | Estimated without Dummy | Observed | Estimated with Dummy | Estimated without Dummy | Observed | Estimated with Dummy | Estimated without Dummy |
| 1990 | 597800 | 647826 | 641107 | 186600 | 209887 | 197296 | 309400 | 321622 | 301994 | 111600 | 119898 | 118794 |
| 1991 | 710000 | 637892 | 629439 | 234400 | 207292 | 192036 | 349400 | 326269 | 303215 | 124800 | 117979 | 116688 |
| 1992 | 840900 | 844775 | 847561 | 298000 | 296465 | 299605 | 408200 | 406541 | 407773 | 145800 | 146017 | 146400 |
| 1993 | 924500 | 909024 | 911307 | 339400 | 337373 | 341092 | 441500 | 444257 | 448120 | 161000 | 158147 | 158492 |
| 1994 | 948700 | 938656 | 940313 | 359800 | 359019 | 362495 | 465600 | 461124 | 465954 | 163400 | 164626 | 164878 |
| 1995 | 928300 | 921992 | 920555 | 357200 | 359665 | 358331 | 472500 | 465149 | 444550 | 160430 | 163207 | 163053 |
| 1996 | 869300 | 856946 | 851914 | 354800 | 334452 | 326917 | 454500 | 444794 | 436133 | 161600 | 153696 | 153037 |
| 1997 | 822600 | 842652 | 837923 | 330100 | 332948 | 324247 | 429600 | 438352 | 428420 | 155000 | 154628 | 153830 |
| 1998 | 778600 | 822957 | 817618 | 294600 | 317791 | 307571 | 402100 | 425801 | 413167 | 146800 | 151592 | 150710 |
| 1999 | 742900 | 746637 | 760643 | 243000 | 244192 | 269069 | 347300 | 342872 | 379163 | 137000 | 139819 | 141985 |
| 2000 | 718400 | 714590 | 727333 | 211400 | 210185 | 233882 | 306300 | 310813 | 344134 | 136400 | 133527 | 135574 |
| 2001 | 710900 | 675752 | 678791 | 173200 | 173317 | 185940 | 255500 | 266212 | 284556 | 136800 | 130296 | 130686 |

Source:  Numbers calculated from the estimate equation presented above with and without dummy variable

Two figures are provided here to demonstrate how the number of single parent families on social assistance observed and estimated with and without dummy variable have deviated since the implementation of the NCB.
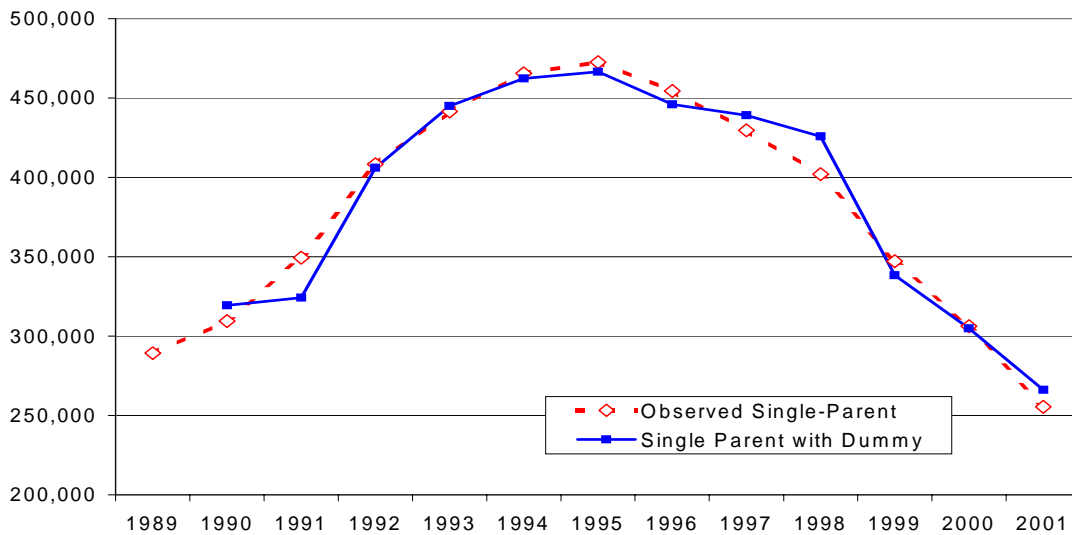
**Figure 3: Observed and Estimated Number of Single-Parent Families in Receipt of Social Assistance**



Source: Obtained from Table 2

Figure 3 shows how the estimated (without dummy) and the observed number of single parent families on social assistance track. The figure shows that the two numbers are very close until 1997, but starting in 1998, a very slight diversion appears that widens during 1999, 2000 and 2001. This deviation could be attributed to the NCB.

**Figure 4: Observed and Estimated Number of Single-Parent Families in Receipt of Social Assistance (with Dummy)**



Source: Obtained from table 2

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At the same time, Figure 4 shows that the observed and the estimated number of single parents families estimated using Equation (2), given above, track well. That is, the deviation visible in Figure 3, starting in 1999, disappears. This is due to the contribution of the dummy variable, which reduces the number of single parent families on social assistance. This reduction in the number of social assistance recipients—single parent families --may be attributed to the impact of the NCB. A similar picture emerges for couples with children, but not for single persons and couples without children.

## V. RESULTS

Estimations of Equations (1) and (2) show that the dummy variable is statistically significant, which implies that there has been a shift in the behavior of social assistance recipients in the category of single parents and couples with children since the implementation of the NCB. The negative sign of the estimated coefficients in both equations of the dummy variable suggests a decline in the number of recipients since 1998 in these categories, which is confirmed by a decline in the actual numbers on social assistance in these categories since 1998.

At the same time, estimated Equations (3) and (4) show that the dummy variable is not significant in these equations, which suggests that there has been no shift in the behavior of social assistance recipients in the category of single persons and couples without children. This is consistent with the proposed theory. The equations (Equation (1) to (4)) further show that the number of social assistance recipients in the single person family group is the most impacted group by the lagged unemployment rate than any other family group--couples without children and couples with children, and single parent families.

Alternate equations presented in the Appendix estimated to estimate the standardized number of social assistance beneficiaries using the lagged unemployment rate, the time trend variable (replacing the lagged dependent variable) and the dummy variable as independent explanatory variables show the same results as the Equations (1) to (4) presented above. These alternate specifications were estimated to evaluate the effect of lagged dependent variable when used as an independent explanatory variable in Equations (1) to (4). The dummy variable is statistically significant at least at the 5% significance level in both specifications for couples with children and single parent families, which suggests that the NCB has encouraged families with children including single parents on social assistance to leave social assistance to work.

## VI.  CONCLUSION

Based on the results provided above, it is reasonable to assume that the NCB may have influenced families with children and single parents on social assistance to leave welfare for the world of work. However, it is not possible to rule out the impact of provincial workfare and other regulations which may have played a part in reducing the welfare rolls. On the other hand, if provincial regulations and workfare were responsible for the reduction in the number of welfare recipients, then the reduction ought to be uniform throughout the welfare population and not for families with children alone. Since the results show that the decline in the number of families with children on social assistance is significantly larger than the decline in the number of families without children, it is logical to conclude that a program targeted to children is responsible for this decline.

**APPENDIX**

**Alternate equations estimated for social assistance recipients using three independent explanatory variables: the unemployment rate, the time trend variable and the dummy. These equations are:**

Couples with Children

$$RCWK(t) = -4.0902 + 2.1625 \; URATE(t-1) + 0.4411 \; TR - 5.2005 \; DUM \quad .........(1)$$
$$\qquad\quad (-1.04) \quad (5.74) \qquad\qquad (2.07) \qquad (-2.55)$$

Adj. R- squared = 0.89   DW = 2.46   RMSE = 1.6357

Estimation Period   1990 to 2001

Single Parents

$$RSP(t) = 4.9480 + 2.1238 \; URATE(t-1) + 0.2223 \; TR - 5.5222 \; DUM \qquad ............(2)$$
$$\qquad (1.22) \quad (5.49) \qquad\qquad (1.01) \qquad (-2.63)$$

Adj. R-squared = 0.90   DW = 2.18   RMSE = 1.6819

Estimation Period   1990 to 2001

Single Persons

$$RSING(t) = 8.6672 + 4.4517 \; URATE \;(t-1) + 0.1916 TR - 1.2483 DUM$$
$$\qquad\qquad (1.18) \quad (6.38) \qquad\qquad (0.49) \qquad (-0.33)$$

Adj. R-Squared 0.86     DW = 2.22   RMSE= 3.0322

Couples without Children

$$RNOK(t) = 3.1430 + 0.6032 \; URATE(t-1) + 0.1297 TR - 0.8181 \; DUM \qquad ............(4)$$
$$\qquad\quad (3.07) \qquad (6.17) \qquad\qquad (2.35) \qquad (-1.55)$$

Adj. R-Squared = 0.88   DW = 2.27   RMSE = 0.42435

Where,
RCWK, RSP, RSING and RNOK are the same variables as above in the text. Except,

TR= Time trend variable

The dummy variable is statistically significant in Equation (1) and (2) and insignificant in Equation (3) and (4), which suggests that the NCB has influenced the behavior of couples with children and of single parents on social assistance to leave social assistance for the work force. The unemployment rate is statistically significant in all four equations. This suggests that social assistance cases are strongly dependent on the rate of unemployment, which could be thought to represent the economy.

**Equations Estimated without Dummy Variable**

$$RCWK(t) = -7.5699 + 0.405\ RCWK(t-1) + 1.8839\ URATE(t-1)$$
$$\quad\ \ (-2.86)\quad\ \ (2.92)\qquad\qquad (4.98)$$

Adj. R-Squared =0.91  DW= 1.76    RMSE =1.4922

Estimation Period 1990  to 2001

$$RSP(t) = -5.0156 + 0.4369\ RSP(t-1) + 1.9588\ URATE(t-1)$$
$$\quad\ (-1.50)\quad\ \ (2.40)\qquad\quad (4.00)$$

Adj. R-Squared =0.89        DW = 0.93      RMSE= 1.7835

Estimation Period 1990 to 2001

$$RSING(t) = 5.5975 + 0.2304\ RSING(t-1) + 3.6086\ URATE(t-1)$$
$$\quad\ (1.09)\quad\ \ (1.50)\qquad\qquad (4.79)$$

Adj. R-Squared =0.90   DW= 2.02      RMSE = 2.5936

Estimation Period 1990 to 2001

$$RCNOK(t) = 1.7847 + 0.3458\ RCNOK(t-1) + 0.4643\ URATE$$
$$\quad\ \ (1.87)\quad\ (2.54)\qquad\qquad\ (4.73)$$

Adj. R-Squared = 0.89  DW= 1.96  RMSE= 0.39783

Estimation Period 1990 to 2001

Regression Equation for Single Parents replacing the both Sexes Unemployment Rate with the Female Unemployment Rate

$$RSP(t) = -1.2376 + 0.4298\ RSP(t-1) + 1.871\ FUATE(t-1) -3.1589\ DUM(t)$$
$$\quad\ (-0.43)\quad\ \ (4.47)\qquad\qquad (4.65)\qquad\qquad (-3.52)$$

Adj.R-Squared =0.97     DW= 2.2          RMSE= 0.95478

Estimation Period 1990 to 2001

Where FURATE = Female Unemployment Rate

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