University of Alberta

The Role of Welfare Administrators in Welfare Participation in Canada

by

Worawan Chandoevwit ©

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Doctor of Philosophy

Department of Economics

Edmonton, Alberta

Fall 1999

0-612-46816-X

University of Alberta

Library Release Form

Name of Author:	Worawan Chandoevwit
Title of Thesis:	The Role of Welfare Administrators in Welfare Participation in Canada
Degree:	Doctor of Philosophy
Year this Degree Granted:	1999

Worawan Chan.

189/3 M. 3, Sukumwit Rd.
Klang district, Muang
Rayong 21160 Thailand

September 28, 1999

University of Alberta

Faculty of Graduate Studies and Research

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled **The Role of Welfare Administrators in Welfare Participation in Canada** submitted by **Worawan Chandoevwit** in partial fulfillment of the requirements for the degree of **Doctor of Philosophy**.

Dr. B. Dahlby (Co-Supervisor)

Dr. S. Landon (Co-Supervisor)

Dr. M. McMillan

Dr. D. L. Ryan

Dr. H. Krahn

September 27, 1999

Dr. L. Osberg (External Reader)

To

my parents

ABSTRACT

Models of welfare participation that include both the welfare participation decisions of individuals and the selection decisions of welfare administrators are developed. An individual's welfare decision is based on budget constraint variables, personal and household characteristics, province of residence, and the unemployment rate. A welfare administrator's selection decision is based on an applicant's characteristics and past income, province of residence, and province-related variables. Pooled cross-section time-series (monthly) data from the 1988-90 Labour Market Activity Surveys (LMAS) are employed. The results show that the estimated coefficients on the wage rate, welfare tax rate, and welfare benefit are generally consistent with the theoretical predictions of the standard labour supply model. Estimates of the coefficients associated with several variables indicate an important role for administrative selection.

The role that welfare administrators play in welfare and work participation and in the selection of participants for employment and training (ET) programs is studied using survey data for Alberta. These ET programs are expected to increase participants' earnings and their likelihood of working and staying off welfare. The results show that age, education level and family type are significant determinants of ET program participation. However, ET program participation does not have a positive impact on participants' earnings, although it has a positive impact on participants' likelihood of working. Only long term ET program participation is found to have a positive impact on participants' likelihood of staying off welfare.

ACKNOWLEDGEMENT

I am fortunate to have had two helpful and supportive supervisors, Drs. Bev Dahlby and Stuart Landon. I thank them for guiding me in all details while working on this thesis, correcting errors, and providing critical comments. I also thank Dr. David Ryan for suggesting methods of improvement and providing useful comments. They are not, however, responsible for any errors that may remain in this thesis.

I thank Chuck Humphrey of the Data Library, University of Alberta, for very helpful assistance relating to the data used in Chapter 3. I thank the Population Research Lab (PRL) at the University of Alberta for providing the survey data used in Chapter 4. I thank the Donner Foundation for providing the (PRL) with the funds required to collect this survey data.

I am grateful to the Canadian International Development Agency (CIDA) for a scholarship during my years at the University of Alberta and to the Department of Economics, University of Alberta, for graduate assistantships. I also thank Dr. Mingsarn Kaosa-ard and Thailand Development Research Institute (TDRI) for providing me with an opportunity to extend my academic training.

I thank my adopted parents, Bill and Nancy Meier, for being so caring and encouraging. But most importantly, I must also thank my husband, Jarin Paphangkorakit, for his support and steady confidence in me when it seemed most difficult to bring this work to completion.

TABLE OF CONTENTS

page

page

LIST OF TABLES

page

page

LIST OF FIGURES

page

CHAPTER 1

INTRODUCTION

The Canada Assistance Plan (CAP), a method of financing social assistance[1] in Canada, was a federal-provincial program from 1966 to 1995. The motivation for the CAP was fiscal equity. To promote horizontal equity, the federal government shared 50 percent of the cost of provincial social assistance programs.[2] To promote vertical equity, provincial welfare programs financed by the CAP redistributed income from the better off to the poor. Starting in the 1996 fiscal year, the federal government replaced the CAP with the Canada Health and Social Transfer (CHST). The CHST is a block-funding program covering federal transfers to the provinces for Medicare, post-secondary education, and social services and welfare.

Since the CAP was introduced in 1966, the number of welfare recipients has been gradually increasing. In the early 1970s, approximately 5-6 percent of the Canadian population received social assistance or welfare (Figure 1.1). This proportion kept increasing and peaked at 11 percent in 1994.

According to the Constitution Act of 1982, each province in Canada is responsible for the design, administration and delivery of its own welfare programs. Most

---

[1] Throughout, "welfare" and social assistance will be used interchangeably.

[2] Except for Ontario, Alberta and British Columbia. The cost-sharing scheme was applied to these three provinces until 1990. For fiscal years 1990/91 through 1994/95, the growth in CAP transfers to these provinces was limited to 5 percent annually.

provinces have a single provincial social assistance program, but some provinces, such as Nova Scotia, Ontario and Manitoba, have a two-tier social assistance program. In these provinces, the provincial authority provides welfare to persons with long-term needs, and the municipal authority provides welfare to persons who are not covered by the provincial programs.

To apply for welfare, an individual must submit an application to the appropriate authority. In general, the only eligibility requirement for welfare is need, regardless of cause (Canada Human Resources Development, 1994, p. 57). To determine an applicant's welfare eligibility and welfare entitlement, a "needs test" is carried out by welfare administrators. Under this test, a welfare applicant can retain a fixed maximum amount of fixed and liquid assets (which is called the fixed and liquid assets exemption). If a household has financial resources above the fixed and liquid assets exemption, they must use this excess amount to cover their needs. If a household has financial resources below the fixed and liquid assets exemption, they may be entitled to welfare benefits. The amount of the benefit to which a household is entitled is determined by the household's needs and financial resources. Welfare administrators calculate a household's needs for food, clothing, shelter and other essential items. Welfare applicants are entitled to the amount of their needs in excess of their available resources. Benefits may be provided as cash or "in kind" in the form of vouchers, goods or services. However, due to data availability, the welfare programs considered in this thesis include only cash benefits.

Since welfare administrators have extensive authority in their jurisdiction to determine which individuals are eligible for welfare and the benefit level to which each welfare applicant is entitled, they can, to a large extent, control who will receive welfare benefits (welfare participation) and who will be moved off welfare (welfare *non*-participation). Nevertheless, the literature on welfare participation has paid very little attention to the role of welfare administrators.

In previous studies of welfare participation, pecuniary and non-pecuniary factors have been included as determinants of an individual's welfare participation decision. Pecuniary factors include the level of the welfare benefit, the welfare tax rate, the level of the earnings exemption, the wage rate and non-labour income, while non-pecuniary factors include time costs, transaction costs, information costs and stigma costs. A change in any of these factors may affect the individual's decision to choose welfare.

However, in the Canadian welfare system, some employable individuals who are eligible according to the needs test may wish to receive welfare benefits, but they may not be allowed to collect benefits. In other words, welfare participation may not be determined only by an individual's decision (the demand side), but also by other factors such as selection by welfare administrators (supply side). This type of selection may prevent some individuals from receiving welfare. Each province in Canada may have a different degree of administrative selection. In a rich province, welfare administrators may be less selective and welfare payments may be more generous.

An important contribution of this thesis is to analyze the role of welfare administrators in determining welfare participation. By taking into consideration the role of welfare administrators, this study is expected to provide a more informative way of studying welfare participation. The results from the study are expected to improve our understanding of welfare participation in Canada, and, most importantly, contribute to Canadian public policy concerning welfare programs.

In addition to the role of administrative selection in welfare participation, welfare administrators may be able to stop granting benefits to some welfare recipients (*i.e.*, there may be a role for administrative selection in welfare non-participation). This role may be more apparent when welfare administrators want to control welfare costs or when there are administrative changes or welfare reforms.

An interesting case of administrative changes is the Alberta welfare reforms of 1993. The main aim of these reforms was to promote training, employment and self-sufficiency. Consequently, employment and training (ET) initiatives, eligibility tightening and benefit reduction were implemented. Moreover, welfare recipients were asked to develop employment plans, some of which were to include ET program participation. As a result of these reforms, the welfare caseload in Alberta fell drastically, a larger number of welfare recipients participated in ET programs, and government expenditure on welfare programs declined substantially during the 1993-96 period.

Since ET initiatives played a major role in the administrative changes, it is possible that they may have been used as an instrument to move welfare recipients off welfare and to push welfare recipients to work. It may also have been the case that certain types of welfare recipients, those with better job opportunities, were more likely to be selected by welfare administrators for ET program participation. Participation in ET programs could possibly increase the likelihood that current welfare recipients enter the work force and leave welfare, or the likelihood that former welfare recipients stay off welfare. Moreover, ET program participation could possibly increase participants' earnings and help them become self-sufficient as intended by the reforms. Consequently, the second contribution of this thesis is to examine the effect of ET programs (as one form of administrative change) on the earnings and welfare and work decisions of individuals.

1.1 Overview of Canadian Welfare Participation

The Canada Assistance Plan (CAP) committed the federal government to sharing half of the approved costs of provincial social assistance programs. However, as a result of fiscal restraint measures, the 1990 and 1991 federal budgets imposed a "cap" on CAP transfers to the "have" provinces. That is, annual increases in the federal contribution under the CAP to Ontario, Alberta and British Columbia were limited to 5 percent per year (using 1989/90 as the base year) until the end of 1994/95. This meant that in these provinces the marginal cost of each additional dollar spent on welfare had risen.

In 1971, five years after the introduction of the CAP, approximately 7 percent of the population of Canada were on welfare (Figure 1.1). The proportion of people on welfare dropped to a low of 5 percent in 1974 and remained below 6 percent until 1980. When Canada experienced a recession during the 1981-82 period, there was a strong upward ratchet in the number of welfare recipients. Figure 1.1 shows that the recession during the 1990-94 period had a strong effect on the number of welfare recipients. That is, between 1990 and 1994 the proportion of people on welfare showed a large upward movement, reaching a peak of 11 percent in 1994. The proportion of people on welfare after 1994 declined as rapidly as it increased in the 1991-94 period. This could be the result of the welfare reforms in Alberta in 1993, the economic recovery in Canada after 1994, the benefit reduction in Ontario in 1995, or the replacement of the cost sharing CAP with the block-funding CHST.

As shown in Figure 1.2, during the 1981-83 and 1990-93 periods, there were sharp decreases in the employment to labour force ratio and increases in the unemployment rate. The proportion of people on welfare increased during the same periods. That is, there was a negative relationship between the proportion of people on welfare and the employment to labour force ratio, but a positive relationship between the proportion of people on welfare and the unemployment rate. However, during the 1983-89 and 1993-94 periods, these relationships did not hold. The employment to population ratio increased, the unemployment rate fell, but the proportion of people on welfare barely changed. Brown (1995) suspected that high welfare caseloads during the period of economic recovery could be due to the diminishing real earnings of low skilled workers. That is, when work is not paid well enough, welfare becomes more attractive than work for some low-skill workers.

Figures 1.3 and 1.4 show the real welfare benefit levels (at 1986 prices)[3] in the three "have" provinces as well as in Quebec (the province with the highest proportion of people on welfare before 1990). Welfare recipients in these four provinces accounted for 83 percent of Canadian welfare recipients in 1990 and 85 percent in 1998.

Real welfare benefits for single persons and single parents are always higher in Ontario than the welfare benefits in the other provinces. The benefit rates in Ontario kept increasing from 1989 to 1994, while the proportion of people on welfare in Ontario rose from 6 percent to 13 percent (Figure 1.5). Clark (1995) showed that, in 1992, single

[3] Real welfare benefits are calculated using the data from Tables A.3 and A.4.

parents with one child in Ontario who worked full-time in a minimum-wage job would earn $4,685 a year less than if they were on welfare.

Real welfare benefits in Quebec were quite stable during the 1989-96 period, except for those of single persons. Before 1989, the benefit rate for single persons below 30 years of age was about 40 percent of the benefit rate for single persons who were above 30 years of age. The benefit rates for these two groups were equalized in 1989. Fortin and Lacroix (1997) showed that the higher welfare benefit increased the length of welfare spells for single persons below age 30.

Real welfare benefits in British Columbia during the 1989-96 period were the most stable compared to the other three provinces. Nonetheless, the proportion of people on welfare in this province swung up and down during the same period. This indicates that there may be other factors, *e.g.*, administrative changes, that affect the number of welfare recipients and these factors may be as important as the welfare benefit level.

The welfare reforms in Alberta in 1993 may be a good example showing that administrative changes can explain part of the fluctuation in the proportion of people on welfare. From Figures 1.3 and 1.4, real welfare benefits in Alberta were reduced in 1994. However, the proportion of people on welfare in Alberta (Figure 1.5) started declining in 1993 when welfare reforms were first introduced.

Figure 1.5 shows that, before 1990, the fluctuation in the proportion of people on welfare in the four provinces had no common pattern. Yet, after 1990, these proportions had the same pattern. That is, they moved upward and then downward until 1998. Economic factors and the level of welfare benefits alone may not be able to explain these movements. When job opportunities fall, the proportion of people on welfare rises.

However, when job opportunities improve, this proportion does not always seem to change. Moreover, even when the level of welfare benefits is steady, there is still some fluctuation in the proportion of people on welfare. Therefore, there are likely other relevant factors that affect the proportion of people on welfare. One of these factors may be administrative changes to welfare programs.

1.2 A Brief Literature Review

Studies that point out the role of welfare administrators include Hefferman (1973), Blank and Hanratty (1993) and Boessenkool (1997). Hefferman (1973) indicated that two identical welfare recipients under the Aid to Needy Families with Children (ANFC) program could end up with two different benefit levels and average tax rates due to administrative discretion. Blank and Hanratty (1993) investigated the welfare take-up rate in the U.S. and Canada. They concluded that the welfare take-up rate for single parents in Canada did not have a positive correlation with the benefit rate, probably because welfare administrators were more restrictive when the benefit rate increased. Moreover, using macro-level data, Boessenkool (1997) showed that five-sixths of the increase in welfare caseloads between 1991 and 1995 in British Columbia, and nine-tenths of the decline in welfare use in Alberta between 1993 and 1996, could be explained by administrative changes.

In previous studies of welfare participation, an individual's decision to receive welfare benefits is specified to be determined by the wage rate, the welfare benefit, the welfare tax rate, and the level of earnings exempted from the welfare tax. Changes in these factors affect the individual's budget constraint and, therefore, may affect their decision to be on welfare. For example, a higher wage rate may increase an individual's earnings, and higher earnings may reduce the likelihood that an individual participates in welfare. Charette and Meng (1994), Dooley (1996), and Christofides, stengos and Swidinsky (1997) all showed that a higher wage rate reduced Canadian welfare participation. A higher welfare benefit or earnings exemption increases income from welfare. This may make welfare more attractive, especially for low skilled individuals. For example, Allen (1993), Charette and Meng (1994) and Dooley (1996) showed that the welfare benefit had a positive effect on welfare participation. Charette and Meng (1994) and Dooley (1996) showed that the earnings exemption also had a positive effect on welfare participation. However, Charette and Meng (1994) and Dooley (1996) showed that the welfare tax rate does not have significant effect on welfare participation.[4]

Non-pecuniary costs of welfare participation, such as time costs, transaction costs, information costs and stigma costs, are expected to reduce the attractiveness of welfare. Moffitt (1983) developed a model of welfare participation that included the stigma cost. He showed that being young, having a large family, or living in a state with a high unemployment rate were factors associated with a higher probability of welfare participation. Additionally, Allen (1993), Charette and Meng (1994) and Dooley (1996) showed that women with higher levels of education were associated with a lower probability of welfare participation.

Other factors, such as administrative selection, may also affect welfare participation, but administrative selection has not been examined formally in the

[4] A more extensive review of the literature is provided in Chapter 2.

literature. Specifically, with this type of selection, eligible individuals may not receive welfare, even if they would like to do so.

In addition, welfare eligibility is another important issue that has frequently been overlooked in the literature. The needs test defines whether an individual is eligible for welfare. Individuals who have high incomes are not eligible for welfare according to the needs test and, therefore, welfare is not an option they can choose.

To bridge these gaps in the literature on welfare participation, we take into account the role of administrative selection and welfare eligibility in the determination of welfare participation (Chapter 3). In doing this, we examine the welfare behaviour of both single persons and single parents. The welfare participation decisions of single persons have not been widely studied, probably because they tend to be short-term welfare users (Barrett and Cragg, 1998, and Shillington, 1998). Yet, the National Council of Welfare (1998) showed that single persons accounted for more than 50 percent of welfare caseloads during the 1990-97 period, while single parents accounted for approximately 30 percent of welfare caseloads during the same period.

Besides administrative selection, administrative changes may also affect welfare participation, as shown by Boessenkool (1997). Boessenkool investigated the effect on welfare recipients of the welfare reforms in Alberta in 1993 (*i.e.*, employment and training initiatives, tightened eligibility and misuse controls, and benefit reduction). His study showed that these administrative changes reduced new inflows into welfare and transferred many welfare recipients to employment and training initiatives. Young employable individuals were the most likely to be prevented from gaining access to welfare.

Two other studies, by the Canada West Foundation (1997) and Shillington (1998), also examined the effect of the Alberta welfare reforms on persons who were on welfare during the period 1993-96. Both studies showed that in 1996 more than half of welfare recipients who left welfare entered the workforce. Shillington indicated that there tended to be no difference between the number of months spent on welfare before and after individuals participated in employment and training programs.

However, these two studies did not emphasize the role of employment and training initiatives even though these were the main administrative changes in the Alberta welfare reforms. It is interesting to study empirically how these initiatives affected the welfare and work decisions of welfare recipients. Boessenkool (1997), by examining the macro data, concluded that there was little evidence to show that individuals directed to education returned to the welfare roll after the reforms. Moreover, one might want to know whether (costly) employment and training program participation has improved the earnings of welfare recipients.

1.3 Organization of the thesis

The next chapter of this thesis provides a literature review. The review starts with static models of welfare participation. Both the models used in the literature and the existing empirical results are reviewed in detail, and gaps in the literature are indicated. The review of the static model literature is followed by a review of the empirical results from dynamic models of welfare participation. Even though this thesis does not involve a dynamic model of welfare participation, the review of this literature gives a broader background for our analysis of welfare participation. As the welfare reforms in Alberta focused on employment and training programs, a review of the literature on employment and training programs is included at the end of Chapter 2.

Chapter 3 of the thesis studies the role of administrative selection in determining welfare participation in Canada. In this chapter, we develop a general model of welfare participation that allows welfare participation to be constrained by administrative selection. This model is estimated using monthly information on the welfare status and earnings of individuals from the 1988-90 Labour Market Activity Survey (LMAS). Separate empirical estimates are calculated using data on single persons and single parents. The data is separated in this way because these two groups may have different behaviour and welfare administrators may treat them differently. Moreover, in this chapter we also point out the significance of welfare eligibility in the analysis of welfare participation.

Chapter 4 studies the effect of employment and training initiatives in Alberta on welfare non-participation, work participation and the earnings of current and former welfare recipients. In this chapter, we assume that welfare administrators decide who should participate in employment and training programs. Their decision is based on the characteristics of welfare recipients. A model in which welfare and work decisions are determined jointly is constructed. The empirical study is implemented using data from telephone interviews which were conducted by the Population Research Lab (PRL) at the University of Alberta.

Different data sets are used in chapters 3 and 4 to analyze different types of administrative selection. In chapter 3, the sample includes single persons and single parents from all the provinces in Canada. Individuals in different provinces of Canada may have different welfare behaviour. Moreover, different welfare administrators, as well as variations in fiscal factors across provinces, may have differing effects on the desire and ability of individuals to participate in welfare programs. In contrast, the analysis in chapter 4 uses a sample that includes only (all types of) welfare recipients in Alberta. The focus of this chapter is on the effect of administrative changes on welfare recipients, rather than on eligible individuals or individuals who may or may not be on welfare. One of the hypotheses examined in chapter 4 is that welfare administrators select some welfare recipients to leave welfare (welfare non-participation), while, in chapter 3, welfare administrators select individuals, from among all eligible individuals, to receive welfare benefits (welfare participation).

Another consideration of this thesis is the use of monthly data to analyze the static model of welfare participation and non-participation. This is a nontrivial contribution because welfare eligibility is determined monthly, and factors that affect an individual's welfare decision and an administrator's selection decision can be changed more frequently than once a year. Therefore, the use of monthly data is expected to provide a better opportunity to determined the roles of these factors.

Finally, the last chapter of the thesis provides conclusions.

1.4 Conclusions

Our findings in chapter 3 reject the hypothesis that administrative selection has no effect on welfare participation. Both individual decisions and administrative selection are found to be significant determinants of Canadian welfare participation. The effects of the welfare benefit level and the welfare tax rate have the expected signs (positive and negative, respectively). When the role of administrative selection is omitted from the estimated model, the effect of the welfare benefit on welfare participation always has an unexpected (negative) sign.

The results in chapter 3 show that administrative selection varies according to family status (*i.e.*, single person or single parent families). In particular, we find that provincial per-capita income and the provincial ratio of the government deficit to GDP both have a positive impact on a single parent's probability of being selected for welfare, but have a negative impact on a single person's probability of being selected for welfare. In addition, we find that an individual's decision to apply for welfare and the administrator's selection are inter-dependent. During periods in which there are many welfare applicants, welfare administrators may be more selective with respect to single persons, but not with respect to single parents.

Our findings in chapter 4 show that certain types of welfare recipients (*e.g.*, individuals who are young or single parents who have more than high school education) are more likely to participate in ET programs. Current ET program participation has a significant negative effect on participants' current earnings. However, previous participation in ET programs does not have a significant positive effect on current earnings. Both current and previous ET program participation have a negative impact on the probability that an individual will exit or stay off welfare. However, the longer an individual spends participating in ET programs, the higher the probability that the individual will exit or stay off welfare. Finally, individuals who completed ET programs or who left ET programs have a higher probability of work participation.

Our findings in chapters 3 and 4 indicate that welfare participation and non-participation are determined by both the demand (an individual's decision) and supply (the welfare administrator's selection decision) sides. The role of administrative selection is more obvious in the case of welfare participation, probably because it is politically easier to select an individual to enter welfare than to select a welfare recipient to leave welfare. Also, welfare administrators tend to be more restrictive with single persons than with single parents.

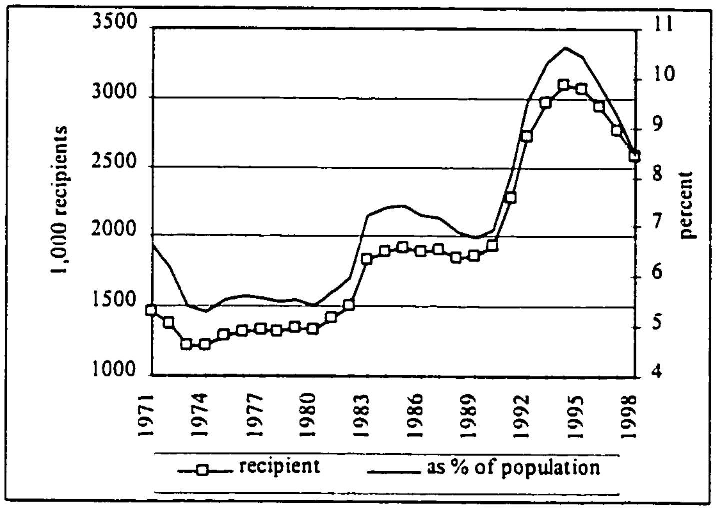

Figure 1.1 The Proportion of Welfare Recipients to Population

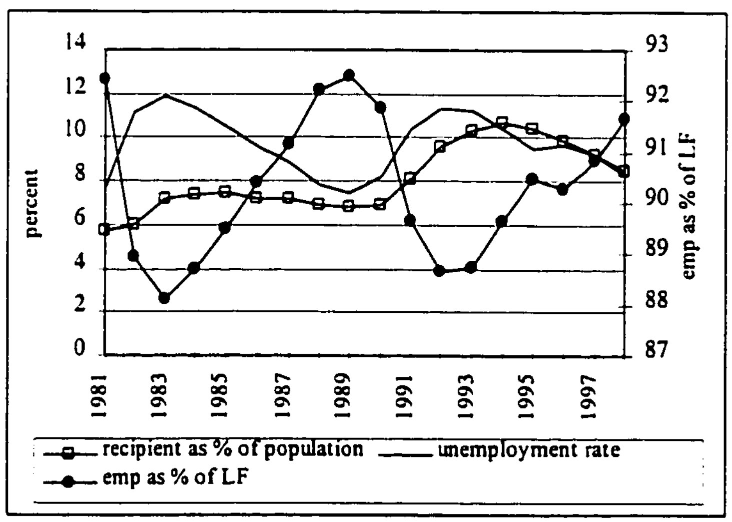

Figure 1.2 The Proportion of Welfare Recipients and Job Opportunities

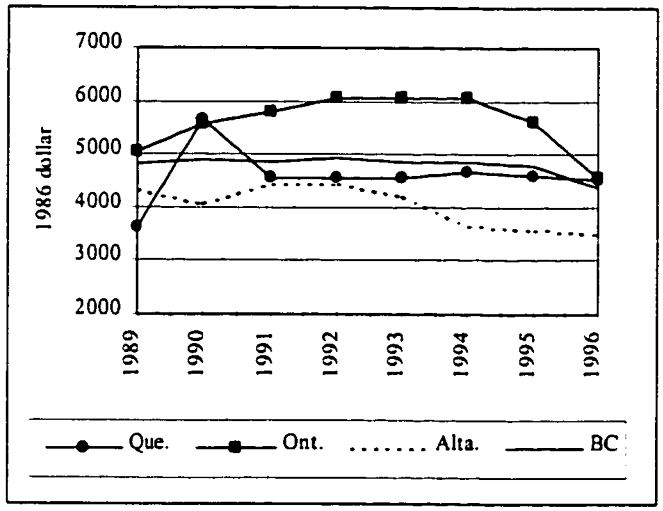

Figure 1.3 Welfare Benefit: Single Person

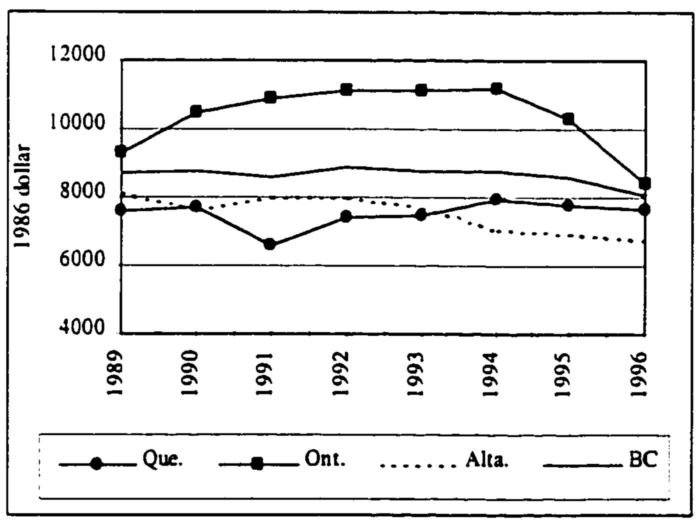

Figure 1.4 Welfare Benefit: Single Parent

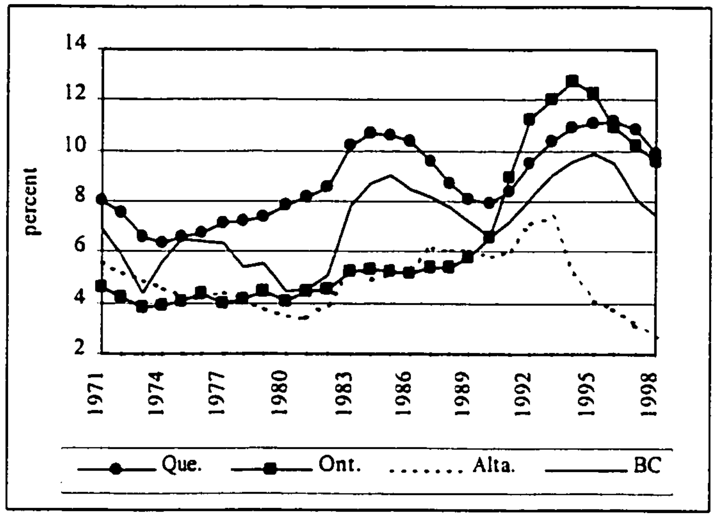

Figure 1.5 Welfare Recipients to Population Ratio in Four Provinces

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

There have been a number of studies on welfare participation, especially on Aid to Families with Dependent Children (AFDC) participation in the U.S. Most of this literature examines the effects of the welfare system on work incentives (or disincentives), welfare participation, welfare dependence, family structure, interstate migration and intergeneration transmission of dependency. Regarding work incentives (or disincentives), the direction and magnitude of the effect of welfare programs on hours of work are examined. The studies on welfare participation look at the factors that affect an individual's decision to receive welfare at a given time, while the studies on welfare dependence examine the factors that determine the transition between being on and being off a welfare program. The literature related to family structure examines the effect of welfare programs on childbearing out of wedlock, marital status, and divorce, while those related to migration discuss the effects of welfare programs on residential location and geographic mobility. In the studies on welfare and intergenerational transmission, the focus is on whether growing up in a welfare household lowers the distaste for welfare, or the transaction costs of welfare, and thereby increases the likelihood of welfare participation. There have been no studies that focus on the role of administrative selection and administrative changes in determining an individual's welfare and work decisions.

This study focuses on the factors that determine welfare participation in Canada and the effects of administrative changes (welfare reforms) on welfare recipients in Alberta. Therefore, this literature review concentrates on these two subjects. Since the model used is a static model of welfare participation, the review of the literature analyzes the existing static model literature in detail (section 2.2). Nonetheless, empirical studies related to welfare dependence (dynamic models) are also discussed (section 2.3) since they provide several insights into the determinants of welfare participation. The effects of the welfare system on family structure, interstate migration and intergeneration transmission of dependency are discussed in detail in Moffitt (1992) and so are not reviewed here. Section 2.4 examines the literature related to the welfare reforms in Alberta in 1993. Since the Alberta welfare reforms emphasized employment and training (ET) programs, the literature on the evaluation of ET programs is discussed in section 2.5. The last section of this chapter provides conclusions.

2.2 Static Models of Welfare Participation

This section focuses on the determinants of welfare participation in a given year. In section 2.2.1, three different econometric models are discussed. The focus in this section is on model specification rather than on the results obtained. These results are discussed in section 2.2.2 which reviews the literature on the incentive and disincentive effects of the welfare system on labour supply and the welfare decision. In section 2.2.3, the literature on the distaste for welfare is discussed. The last sub-section reviews two studies that address the role of administrative discretion in determining welfare entitlements and caseloads.

2.2.1 The Models

In a static model of welfare participation, the welfare decision is a function of the utility difference (P_i^*) between being on and off welfare. While this actual utility difference is unobserved, we do observe whether or not an individual is on welfare. Define a dummy variable P_i to represent a welfare recipient ($P_i = 1$) or non-recipient ($P_i = 0$). When P_i^* is positive, P_i equals one. When P_i^* is nonpositive, P_i is zero.[1]

Table 2.1 summarizes three types of static models used in studies of welfare participation. The single equation or univariate discrete regression model assumes that labour supply (hours worked) is determined independently and is not correlated with the welfare decision. Thus, the welfare participation equation is essentially a reduced form single equation. In the second type of model, work and welfare choices are determined and estimated simultaneously. In the multinomial discrete choice model, the third type of model, the work and welfare choices involve combinations of discrete hours of work and welfare choices. With this model, it is possible to investigate participation in multiple welfare programs and in part-time and full-time work.

i) Single Equation Approach

Allen (1993), Charette and Meng (1994), and Dooley (1996) studied welfare participation in Canada using a univariate discrete regression model assuming that labour supply was exogenous (first row in Table 2.1).

Allen (1993) used data from the 1986 census of Canada. His sample included women whose incomes were below the provincial poverty line and who had lived in the

---

[1] This welfare decision is explained in the theoretical background in Chapter 3.

same province for five years. The independent variables were the provincial benefit rate as a percentage of the provincial poverty line, the provincial level of the liquid asset exemption, provincial GDP, age, and dummy variables representing racial background (an English speaking individual or a native Indian) and the highest level of education.

Charette and Meng (1994) focused on the welfare decisions of unmarried female heads of household who had less than three children using data from the 1989 Labour Market Activity Survey (LMAS). The independent variables they employed were the estimated wage rate, non-labour income, the basic welfare benefit, the earned income exemption, the marginal welfare tax rate, the computed welfare tax rate on earned income, number of children, the unemployment rate, and dummy variables representing training, age group, the level of education, marital status, disability status, first spoken language, minority status, whether an individual is Canadian born, and region of residence.

Dooley (1996) used a time-series of cross-section data from the Survey of Consumer Finances (SCF) for 1973-91. The benefit of working with time-series data was that he could study the change in welfare participation over time. His sample consisted of data on lone mothers who were younger than 60 and who had children below age 18. The independent variables were predicted weekly earnings, the basic welfare benefit, the earnings exemption, the marginal welfare tax rate, unearned income, the unemployment rate, number of children and dummy variables representing age, marital status, education, extended family status, and province of residence.

The studies by Charette and Meng (1994) and Dooley (1996) differentiated disabled from non-disabled welfare recipients by a dummy variable. In general, it may not be appropriate to apply a choice model to disabled welfare recipients as their work limitations and job opportunities may differ according to their disability status. In some cases, disabled persons may not have any other option except welfare.

ii) Simultaneous Equations Approach

Moffitt (1983), Blank (1985), and Bassi (1990) studied welfare participation in the AFDC program. Moffitt (1983) and Bassi (1990) used data from the Panel Study of Income Dynamics (PSID) on female heads of household. Blank (1985) employed data from the Current Population Survey's March Supplement in 1979.

Moffitt (1983) and Blank (1985) derived a model of welfare participation from an individual's utility (U_i) maximization problem, where the total utility depends on hours of work (H_i), total income (Y_i) and welfare participation (P_i). The individual utility function was written as $U_i(H_i,Y_i) - \phi_i P_i$, where P_i equals one if individual *i* is on welfare and zero otherwise. The welfare stigma or non-pecuniary cost of welfare, ϕ_i, was assumed to vary with personal characteristics. Total income (Y_i) was composed of earned and unearned income and welfare income. Given an appropriate budget constraint, the utility function was maximized by fixing P_i and choosing hours of work (H_i). The welfare decision (P_i^*) was determined by the utility difference between being on and off welfare, as in the univariate model, except that the utility difference also depended on the non-pecuniary effect which reduced the maximum utility attained from welfare by ϕ_i.

Moffitt (1983) also allowed stigma (the non-pecuniary effect) to reduce the marginal utility of income from welfare, by replacing total income (Y_i) in the utility function with $w_i H_i + \gamma B_i$, where w_i is the wage rate and B_i is the welfare benefit. Since the parameter γ is less than one, a dollar increase in the welfare benefit (B_i) increased utility (U_i) by less than a dollar increase in labour income (w_iH_i).

Moffitt (1983) and Blank (1985) assumed a linear function for hours of work (H_i), and then derived an indirect utility function and a specification for P_i^*. They assumed bivariate normality for the error terms in the H_i and P_i^* equations (Table 2.1). The parameters in the H_i and P_i^* equations were estimated simultaneously since the unobserved components of the distaste for welfare could be correlated with unobserved components of the taste for work.

Bassi (1990) added one more choice variable, the Food Stamp option (FS_i), to the utility function. She defined the utility (U_i) function as $U_i(l_i,Y_i) - \phi_t P_i - \alpha_t FS_i$, where l_i is hours of leisure, and ϕ_t and α_t are stigma effects from AFDC and Food Stamp participation in time period t. These two stigma variables varied with time dummy variables.

Bassi (1990) assumed a Cobb-Douglas utility function and derived an hours of work equation. The Food Stamp decision (FS_i) was defined as the utility difference (FS_i^*) between receiving Food Stamps and not receiving Food Stamps. Bassi estimated the two participation equations simultaneously (Table 2.1), and then estimated the hours of work equation separately afterwards.

Unlike Moffitt (1983), Blank (1985) and Bassi (1990), Christofides *et al.* (1997) did not specify an individual's utility function, but assumed linear specifications for the labour force participation and welfare participation equations. Unlike Allen (1993), Charette and Meng (1994), and Dooley (1996), Christofides *et al.* (1997) included more household types in their study (*i.e.*, single males, single females, lone fathers and lone mothers). Including single persons in the study is expected to provide a wider and better description of welfare participation in Canada since single persons are the majority of Canadian welfare recipients. For example, about 55 percent of Canadian welfare recipients in 1997 were single persons (National Council of Welfare, 1998).

Using a bivariate probit model, Christofides *et al.* (1997) estimated equations that determine welfare and labour force participation. The hours of work equations for welfare recipients and non-recipients were estimated independently of the welfare and labour force participation equations. The explanatory variables in the bivariate probit equations consisted of variables reflecting personal and household characteristics such as age, education, disability status, visible minority status, immigrant status, being the head of the household, and number of children. In addition, the explanatory variables included the basic welfare allowance, the welfare tax rate, the expected wage rate, and dummy variables indicating receipt of a pension income and Unemployment Insurance (UI) benefits. However, a dummy variable that represents receipt of UI benefits might be an endogenous variable as individuals who do not work choose to receive UI benefits. Thus, the decisions of whether or not to work and whether or not to receive UI benefits might be simultaneous.

iii) Multinomial Discrete Choices

The most recent development in the analysis of the static model of welfare participation is the use of the multiple discrete choice model. This type of model specifies different discrete dependent variables to represent different combinations of hours of work and welfare program participation. The advantage of this method is that participation in the labour force and in multiple welfare programs can be estimated simultaneously (in cases where multiple welfare programs are present). These multiple welfare programs cannot be estimated using other methods. For example, Bassi (1990) estimated Food Stamp and AFDC participation simultaneously and then estimated a labour supply equation independently even though these three decisions are determined jointly.

Keane and Moffitt (1998) and Smith (1997) used a multiple discrete choice model to study multiple options for work and welfare. They assumed a separable utility function that took the form $U_i(H_i, Y_i, P_{1i}, P_{2i}, \ldots, P_{mi}) = U_i^{*}(H_i, Y_i) - \sum_{m=1}^{M} \psi_m P_{mi}$, where P_{mi} is a dummy variable that equals one if individual *i* participates in program *m* and zero otherwise, and ψ_m denotes the marginal disutility of participating in program *m*. The number of welfare programs is M. The budget constraint of individual *i* is $Y_i(H_i, P_{1i}, P_{2i}, \ldots, P_{mi}) = w_i H_i + N_i + \sum_{m=1}^{M} P_{mi} B_{mi}(H_i) - T_i(H_i)$, where N_i is non-labour income, $B_{mi}(H_i)$ is the benefit function from program *m* and $T_i(H_i)$ is an income tax function.

The multinomial discrete choices model can be illustrated by an example. Suppose that there are three work options; no work, part-time work, and full-time work. Let *j* and *k* be different work-welfare combinations of $(H_i, Y_i, P_{1i}, P_{2i}, \ldots, P_{mi})$ for individual *i*. The utility level U_{ij} and U_{ik} are obtained by substituting the budget constraint into the utility function for each work-welfare combination *j* and *k*. Let $d_j = 1$ if a combination $j = (H_i, Y_i, P_{1i}, P_{2i}, \ldots, P_{mi})$ is chosen. Then,

$$d_j = 1 \text{ iff } U_{ij} \geq U_{ik} \ \forall\, k. \qquad \text{(revealed-preference inequality)}$$

In other words, individual *i* will choose work-welfare combination *j* if and only if $U_{ij} \geq U_{ik}$ for all $k = 1,...,3\times2^M$.

For example, if M equals one, there will be six work-welfare options:

P_{1i} = no work, off welfare,

P_{2i} = no work, on welfare,

P_{3i} = part-time work, off welfare,

P_{4i} = part-time work, on welfare,

P_{5i} = full-time work, off welfare, and

P_{6i} = full-time work, on welfare.

With an appropriate budget constraint for each option, individual *i* will choose option P_{6i} if and only if $U_{i6} > U_{ik}$ for $k = 1, 2, 3, 4, 5$. Therefore, the probability that individual *i* chooses option *j* is given by $P_{ij} = \Pr(U_{ij} \geq U_{ik})$ for all *k*.

Keane and Moffitt (1998) employed the fourth wave of the first panel of the Survey of Income and Program Participation (SIPP 1984) to examine a model of labour supply and participation in the AFDC program, Food Stamps and subsidized housing.[2] Keane and Moffitt (1998) assumed a conventional flexible utility function. They allowed the marginal disutility from work and welfare to vary with the state unemployment rate, state AFDC administrative expenses, and other observable socioeconomic characteristics such as number of children, education, age, race, health, and region of residence. The parameters were estimated by two different simulation methods, a Method of Simulated

[2] They selected only data on female heads of family aged 18-64 who had children under the age of 18, and had asset levels below $4,500. Their sample consisted of 968 women.

Maximum Likelihood (SML) and a Method of Simulated Moments (MSM). However, these two methods yielded approximately the same parameter estimates.

Smith (1997) used a multiple discrete choices model to study the impact of the 1981 welfare reforms in the U.S. on labour supply and welfare participation.[3] He classified work options into three categories: no work, part-time work, and full-time work. These three discrete labour supply choices, together with two welfare choices, yield six discrete work-welfare choices. Smith assumed a log-linear utility function with stochastic variation for leisure and welfare preferences. The preference for leisure varied with the number of children, age of the head of household, the county unemployment rate, level of education, and a dummy variable representing the presence of children below age six. The preference for welfare participation varied with the level of education and a dummy variable representing non-white individuals. Smith calculated each individual's budget set for all six choices and estimated the utility parameters from the simultaneous choice problem using the maximum likelihood method. His sample included all able-bodied female heads of household under 60 years of age from the PSID in 1978, 1980, 1982 and 1984.

Another study that applied a multinomial discrete choices model is Bingley and Walker (1997) who studied the effect of a welfare program (Family Credit)[4] on work-welfare choices in the UK. Bingley and Walker (1997) assumed that an individual could

---

[3] The 1981 reform reduced the earned income exemption and imposed strict limits on the assets of the welfare recipients.

[4] Family Credit (FC) is an in-work welfare program which is payable to low income families but only if their hours of work exceed some level.

choose among four alternatives: full-time work without FC participation, part-time work with FC participation, part-time work without FC participation, and no work without FC participation. The reduced form equations of these four alternatives were estimated using a Multinomial Probit Random Utility Model. The independent variables were net income, age, number of children, the unemployment rate, year, region of residence, and dummy variables indicating a renter and a widow. The data consisted of 4,248 lone mothers from 15 pooled cross-sections of the Family Expenditure Survey (1978-92).

In the models reviewed here, welfare participation is based on an individual's decision and it is implicitly assumed that there is no constraint from the supply side. In other words, all applicants are assumed to receive welfare whenever they apply for it. However, this is not the case for the welfare program in Canada since applicants are required to meet a needs test for welfare eligibility. In addition, welfare recipients are chosen from among eligible applicants by welfare administrators who may refuse to give welfare even if an applicant satisfies the eligibility requirements. Therefore, welfare participation in Canada may have been constrained on the supply side. Models that focus only on an individual's welfare choice decision (while omitting consideration of possible supply side constraints) may not provide a complete picture of Canadian welfare participation.

2.2.2 The Incentive and Disincentive Effects

The wage rate and welfare variables such as the benefit rate, the welfare tax rate and the earned income exemption[5] are hypothesized to affect the labour supply and welfare participation decisions. A higher wage rate is likely to increase labour supply[6] and, thus, earnings. This is likely to reduce the number of individuals who are eligible and who want to receive welfare. On the other hand, a higher benefit rate and/or a higher earned income exemption increases welfare income. This is likely to increase welfare participation. Moreover, a higher earned income exemption also encourages welfare recipients to work while receiving welfare. A higher welfare tax rate (or benefit reduction rate for the AFDC program) decreases net benefits and will likely discourage welfare recipients from working or encourage them to leave welfare. A detailed theoretical analysis of these effects is undertaken in Chapter 3.

The empirical evidence from the literature discussed in the previous section is summarized in Table 2.2. As can be seen in this table, an individual's wage rate typically has a negative impact on their welfare participation decision while their welfare benefit and/or welfare tax rates have positive impacts on their welfare participation decision. The results from the literature in Table 2.2 differ in magnitude rather than in direction.

Moffitt (1983) showed that the manipulation of the welfare tax rate appeared to be a poor policy instrument to alter work incentives. Lowering the tax rate by 10 percent had

---

[5] When welfare recipients work, their earnings in excess of the earned income exemption are taxed back. The earned income exemption is a fixed amount of earnings that is exempted from welfare tax.

[6] A higher wage rate induces individuals to work more (the substitution effect) and, thus, they earn more. With a higher income from work, individuals want to have more hours of leisure, or less hours of work, given that leisure is a normal good (the income effect). If the substitution effect is stronger than the income effect, a higher wage rate increases labour supply.

virtually no effect on the participation rate and had very little effect on hours of work in the total population. An increase in the benefit level, on the other hand, had a much greater effect. If the benefit level was raised to 65 percent of the poverty line for a family of four, the welfare take-up rate rose by 11 percent, and hours of work among welfare recipients dropped by over 4 hours a week.

Regarding the magnitude of the effects of the welfare benefit and tax rate, Bassi's (1990) findings were somewhat different from those of Moffitt. Using 1981 PSID data, she found that growth in the welfare participation rates of female-headed households in the late 1960s and throughout the 1970s could be largely explained by a decrease in the AFDC tax rate and an increase in involuntary unemployment. The reduction in the level of real benefits had only a small effect on the welfare participation rate of female heads of households.

Smith (1997) and Keane and Moffitt (1998) also found different magnitudes in the effect of the welfare tax on welfare participation. Smith showed that a higher welfare tax rate slightly reduced the AFDC participation rate, but reduced the proportion of recipients who worked from 19 percent to 2 percent. Smith also showed that a lower real benefit had a large impact on the AFDC participation rate. In contrast, Keane and Moffitt showed that lowering the AFDC tax from 100 percent to 50 percent would barely have any effect on labour supply, but would increase participation in both the AFDC and the Food Stamps programs.

Bingley and Walker (1997) showed that the Family Credit (FC) program encouraged individuals to work and had little adverse effect on the incentives of those who already worked. Bingley and Walker found that an increase in the FC benefit rate increased the number of recipients who were part-time workers, and decreased the number of non-recipients who were full-time workers and the number of non-recipients who did not work.[7]

It is possible that the effect of the benefit rate on welfare participation in Canada may differ from the effect on AFDC and FC participation. Blank and Hanratty (1993) and Christofides *et al.* (1997) showed that a higher benefit rate did not lead to a higher welfare participation rate in Canada. Using data from the 1987 Survey of Consumer Finance (SCF) and 1987 Current Population Survey (CPS), Blank and Hanratty (1993) showed that the Canadian transfer program was more generous while its take-up rate was much lower than that for the AFDC program.[8] The Canadian welfare programs had a take-up rate of 60 percent while the AFDC take-up rate was 75 percent. The correlation coefficient between the welfare benefit for single parents and the estimated take-up rates for CAP and for AFDC were –0.591 and 0.152, respectively. Blank and Hanratty (1993) explained that the negative correlation between welfare take-up rates and benefit levels in Canada could be the result of two conflicting factors. As the benefits increased, more individuals applied for welfare. As more individuals wanted welfare, program administrators tended to cut back the number of approved participants in order to control program costs.

---

[7] Since there are four work-welfare alternatives in this study: full-time work, part-time work with FC participation, part-time work without FC participation, and no work without FC participation, the reduction in participation in one of the work-welfare alternatives implied an increase in participation in some other work-welfare alternative.

[8] The welfare take-up rate is the portion of welfare recipient to the number of eligible individuals.

On the other hand, Allen (1993), Charette and Meng (1994), and Dooley (1996) found a different effect of the benefit rate on welfare participation in Canada than did Christofides *et al.* (1997). They concluded that a higher benefit rate increased welfare participation. These conflicting results with respect to the effect of the benefit rate on welfare participation could possibly be a consequence of using different data and types of households. Christofides *et al.* (1997) included all single persons who were less likely to be eligible for welfare. A higher benefit rate may not affect the welfare decision of those ineligible persons since welfare is not their option.

A general finding in the literature is that the wage rate has a negative impact while the benefit rate and the earned income exemption have positive impacts on welfare participation. In addition, the welfare tax rate does not have a significant impact on welfare participation. Concerning the effect of welfare parameters on welfare participation in Canada, Allen (1993), Charette and Meng (1994) and Dooley (1996) found that the earned income exemption had a stronger effect on welfare participation than did the benefit rate. Allen (1993) showed that an increase in the welfare benefit of $1,000 per year would lead to an increase of 100,000 women on welfare, assuming that 2,500,000 women lived below the poverty line. An increase of $1,000 in the level of the liquid assets exemption increased the probability of welfare participation by 5.4 percent which is equivalent to an increase of 135,000 people on welfare. For a reference individual who was a 20-24 year old resident of Ontario with primary school education, who was never married, not disabled, and whose first spoken language was neither English nor French, Charette and Meng (1994) found that the elasticities of welfare participation with respect to the benefit level and the earned income exemption were 0.27

and 0.59, respectively. Dooley (1996) showed that an $1,000 increase in the annual benefit would result in an increase of about three percentage points in the probability of participation. Increasing the earned income exemption by $100 per month would increase the likelihood of welfare participation by two percentage points.

2.2.3 Distaste for Welfare

Distaste for welfare is part of the non-pecuniary cost of welfare participation. It represents welfare stigma, or the feeling that receiving welfare is disgraceful. The distaste for welfare reduces the attractiveness of welfare income. As explained in section 2.2.1, the distaste for welfare is assumed to be a function of personal and household characteristics, and time. It is expected that individuals who are older and have more education tend to care more about what other people think of them. Thus, these individuals are expected to be associated with a higher distaste for welfare. In addition, welfare recipients who have been on welfare for some time may get accustomed to receiving welfare receipts and their distaste for welfare may be low.

In the literature, the distaste for welfare (welfare stigma) is modeled as a random variable that reduces the utility from welfare income. This random variable varies with observed individual and household characteristics and an individual's unobserved distaste for welfare.

Moffitt (1983) modeled one component of welfare stigma as a reduction in utility from receiving welfare and another component of stigma as a reduction in the marginal utility of income from welfare. He showed that the effect of stigma on the level of utility varied with age, family size and the unemployment rate. The younger an individual, the larger the family size or the higher the unemployment rate, the smaller the stigma effect. Those with more education seem to be more concerned about stigma than were those with less education. The young tended to have lower inhibitions against welfare participation than did older individuals. A high unemployment rate reduces earnings opportunities, increases the role of welfare as an alternative source of income, and reduces stigma because of widespread welfare participation.

Blank (1985) studied interstate differences in welfare participation. She showed that a significant percentage of individuals chose not to be on welfare even though it would have provided them with a higher income. This can be explained by the non-pecuniary cost of being on welfare which, in addition to the stigma effect, includes a transaction cost effect. She found that the non-pecuniary cost of welfare participation varied with education, race, the number of children below age 6, and area of residence. Less educated minority women with more young children were the most likely to have a low non-pecuniary welfare cost and, therefore, were more likely to be on welfare.

Bassi (1990) included time parameters to represent the effects of changes in information and transaction costs as well as stigma on an individual's decision to participate in the AFDC and Food Stamp programs. Bassi found that the passage of time caused a monotonic decrease in the non-pecuniary cost of being on welfare and a monotonic increase in AFDC and Food Stamp participation rates. For example, about 0.3 percentage points in 1969 and about 1.4 percentage points in 1979 of the increase in AFDC participation could be explained by time variables while about 8.8 percentage points of the increase in Food Stamp participation in 1979 could be explained by a time variable.

Allen (1993), Charette and Meng (1994), and Dooley (1996) used a univariate discrete choice model that allowed personal and household characteristics to affect the welfare decision. They showed that older and more educated women were less likely to be on welfare. However, Christofides *et al.* (1997) found that older single males and single females were more likely to be on welfare than were younger individuals. Charette and Meng (1994) and Christofides *et al.* (1997) indicated that single parents with children below age six were more likely to be on welfare than those with older children. In addition, both studies found regional differences in the distaste for welfare.

Charette and Meng (1994) showed that 'never married' females were less likely to be on welfare than separated, divorced, abandoned, or widowed females, but were more likely to be on welfare than married females. A disabled individual had a higher probability of being on welfare than a non-disabled individual. Moreover, an individual was more likely to be on welfare if he/she was a member of a visible minority or French speaking.

Generally, the findings on the effect of personal and household characteristics on the distaste for welfare are quite similar across the literature on welfare participation. Older and more educated persons are more likely to be inhibited from applying for welfare. Single parents with young children who have more family responsibilities and less flexibility to work have a lower distaste for welfare than do single parents with older children.

2.2.4 Administrative Discretion

Administrative discretion makes the probability of welfare participation and entitlement levels uncertain. For example, an eligible welfare applicant might be turned down by welfare administrators for unknown reasons. Two apparently identical welfare recipients handled by two different caseworkers might end up with two different entitlement levels. The level of discretion is expected to vary across levels of the welfare administration, and depends on the policies of the government in different jurisdictions as well as on the state of the economy.

Heffernan (1973) investigated the effect of administrative discretion on the benefit level and the effective average negative income tax rate. He used a 10 percent sample of Vermont's Aid to Needy Families with Children (ANFC) records in May 1970. He showed that there was a considerable variation in caseworkers' calculations of family basic needs for the same family size. For example, the calculated basic needs for a family of four (from different caseworkers) ranged from $175 per month to $451 per month. Most of this difference was not random and could be explained by rental cost requirements. However, the variation in the benefit level may also be explained by the generosity of some caseworkers who allowed a larger earnings deduction.

Heffernan indicated that it was impossible to determine precisely the actual average tax rates faced by recipients of public assistance. In the sample of four-person families, nine families who reported monthly incomes between $360 and $390 had average tax rates that varied from 26 to 61 percent. Forty-nine percent of the variation in the tax rate was accounted for by changes in income. The remaining fifty percent was partly due to differences in childcare expenses and partly due to caseworker discretion.

For example, caseworkers who wanted to maximize the benefits of their clients could make up higher deductible expenses for these clients so that the income subject to the welfare tax was reduced.

Heffernan also showed that administrative discretion occurred at the initial level of welfare entitlement. Because of administrative discretion, some applicants were not selected for welfare and this generated variation in welfare recipiency for reasons unknown to the applicants.

Another study of the effect of administrative discretion or administrative change on welfare participation was conducted by Boessenkool (1997). He used time-series data to investigate factors that affected the size of welfare caseloads in Ontario, Alberta and British Columbia. A dummy variable representing an administrative change that involved the introduction of welfare reforms or changes in the government was included in his estimating equations. He found that administrative changes could explain a significant component of changes in welfare use in Alberta and British Columbia.

Since the welfare reforms in 1993, Alberta welfare caseloads have been declining, and by 1996 they had fallen by nearly 50 percent. Boessenkool showed that administrative changes accounted for nine-tenths of the explained decline in welfare use in Alberta between 1993 and 1996. The rest of the caseload change could be explained by changes in the unemployment rate and earnings. More discussion of this study relating to the welfare reforms in Alberta is provided in section 2.4.

Boessenkool (1997) showed that five-sixths of the increase in welfare caseloads between 1991 and 1995 in British Columbia could be explained by an administrative change. When the New Democrats came to power in 1991, the province's welfare programs were taken over by a new minister who made it clear that the ministry's task was to serve clients. As a consequence, the benefit rates and number of cases per unit of population increased. On the other hand, the unemployment rate accounted for only one-fifth of the explained change of caseloads in British Columbia.

The results from Heffernan (1973) and Boessenkool (1997) suggested that the role of welfare administrators should not be ignored when explaining welfare take-up rates. When welfare administrators want to control program expenditure, they may reduce the approval rate of open cases or reduce benefit payments. In both instances, the number of individuals who take up welfare will fall.

There has been no study that includes the role of welfare administrative discretion as a constraint on individual welfare participation decisions. As described above, studies of welfare participation mainly focus on a household's decision without taking into account welfare administrators' discretion or welfare eligibility. In the absence of administrative discretion, welfare applicants can collect welfare if they are eligible and if they choose to do so. However, in a situation where administrative discretion exists, such as in the Canadian welfare system, eligible applicants who desire to receive welfare will not necessarily receive it. In this thesis, we will develop a model which takes account of administrative discretion, or the supply side constraint, when explaining welfare participation. This modification may improve our ability to determine the factors that characterize Canadian welfare participation.

2.3 Dynamic Models of Welfare Participation

A dynamic model of welfare participation explores the transition between two welfare states and welfare dependence. Typically, each individual is assumed to be in one of the two welfare states: on welfare or off welfare. The "on welfare" state (or a welfare spell) is defined as a sequence of consecutive months (or years) of receiving welfare benefits. The "off welfare" state (or an off-welfare spell) is defined as the duration of the period between the end of the previous welfare spell and the commencement of a new welfare spell. Studies that focus on welfare duration determine factors that affect the exit rate (or hazard rate)[9] of on-welfare spells. Studies that focus on the "off-welfare" duration determine factors that affect the exit rate of off-welfare spells or the welfare entry rate. Studies on welfare dependence also focus on duration dependence and occurrence dependence. Duration dependence is a situation where the exit rate from welfare varies with the length of welfare spells, whereas occurrence dependence is a situation where the exit rate from welfare depends on the number of welfare spells.

Most of the literature on the duration of welfare spells analyzes welfare duration in regard to the AFDC program in the U.S. (Table 2.3). The conclusions of the studies vary with the model and data used. However, this review does not focus on the specification of model and estimation methods since the econometric issues and estimation methods can be seen in Kalbfleisch and Prentice (1980), Heckman and Singer (1984), and Kiefer (1988).

---

[9] The "exit rate" and "hazard rate" are used interchangeably in this review.

The next sub-section presents the empirical results related to welfare exit. This is followed by a discussion of studies on welfare recidivism.

2.3.1 Welfare Exit

Studies that examine the pattern of on-welfare spells typically explain the hazard rate of welfare spells or the welfare exit rate. A high exit rate from welfare is associated with short welfare spells and *vice versa*. In general, the literature looks at the effects of personal and household characteristics, labour market opportunities, and welfare parameters on the exit rate from welfare. The variables that represent personal and household characteristics are usually time-invariant whereas labour market opportunities and welfare parameters are time-dependent variables.

It is expected that individuals who are old, who have a low level of education or who have more dependent children may have fewer job opportunities and, thus, may spend a longer time on welfare (or may have a lower exit rate from welfare). Individuals who live in areas with better job opportunities or have high expected wage rates are expected to spend a shorter time on welfare. Higher welfare benefits will increase welfare incomes and are expected to induce welfare recipients to spend a longer time on welfare.

Many studies have shown that personal and household characteristics are very important determinants of the exit rate from welfare. O'Neill *et al.* (1987) and Blank (1989) found that white women who had a higher education, fewer children, and/or fewer young children, exited from the AFDC faster. O'Neill *et al.* also examined the importance of other personal factors, such as healthiness or childbearing during the welfare spell, in determining the hazard rate. They showed that poor health, which could limit both work and marriage opportunities, was associated with a longer welfare spell while early childbearing was not associated with a longer welfare spell. Childbearing during the welfare spell reduced the hazard rate.

Regarding the effect of age on the welfare exit rate, the literature shows no unanimous findings. Blank (1989), Hoynes (1996) and Barrett (1996) found that women who were older exited from welfare faster, but Huang and Cardell (1996) showed that an individual's age had no effect on the welfare exit rate in the U.S. Fortin and Lacroix (1997) found that age had a significant negative impact on the exit rate from welfare in Canada.

Concerning the effect of gender on the welfare exit rate in Canada, Barrett (1996) showed that in British Columbia women had a lower welfare exit rate than men, but Fortin and Lacroix (1997) showed that men and women had similar exit rates from welfare programs in Quebec. With a more informative data set, Fortin and Lacroix also established that additional years of education increased welfare exit rates in all groups except for men in the 30-45 age group.

Many studies have shown that labour market variables play a significant role in determining the length of welfare spells. Higher unemployment rates were found to be associated with lower exit rates and, thus, longer welfare spells (Hoynes, 1996; Sandefur and Cook, 1997; Barrett, 1996; and Fortin and Lacroix, 1997). A higher employment rate, growth of the wage rate, growth of employment in the retail trade and service sectors, and employment to population ratio led to significantly shorter spells (Hoynes, 1996). Moreover, a higher help wanted index, which reflects increased demand for labour, had a positive impact on the welfare exit rate in Canada (Barrett, 1996).

Considering changes in welfare policy, Fortin and Lacroix (1997) showed that the welfare reform in Quebec in 1989 had a significant effect on the welfare exit rate. Before the reform, the basic benefit rate for single persons below 30 years of age was about 40 percent of those for individuals who were above 30 years of age. After the reform, the benefit rates for these two groups were equalized. Fortin and Lacroix showed that the higher welfare benefit had a negative impact on the welfare exit rate of individuals below age 30. With a mean welfare spell duration of 11.38 months and 13.13 months for men and women in the 18-24 age group, respectively, the 1989 reform was estimated to increase these mean durations by 2.27 and 2.34 months. In addition, the reform increased the mean spell duration for men in the 25-29 age group from 16.9 months to 21.6 months.

The effect of welfare policies on welfare exit rates varies by study. Sandefur and Cook (1997) and Blank (1989) found an insignificant effect of the welfare benefit on the exit rate from AFDC. O'Neill *et al.* (1987) and Barrett (1996) showed that the benefit level had a negative impact on the hazard rate. Hoynes (1996) used county Greater Avenues for Independence (GAIN)[10] participation and county expenditure per GAIN participant as indicators of welfare policies. Hoynes showed that a higher GAIN participation rate was associated with a shorter spell whereas higher GAIN expenditure per participant was associated with a longer spell. This result may be due to the intensive training characteristic of GAIN that might delay employment.

---

[10] California's GAIN program is the first and largest welfare-to-work program in the U.S. It stresses education, basic skills, training, and job search.

Regarding patterns of welfare spells, Fortin and Lacroix (1997) found no duration dependence among men and women in the 18-24 and 30-45 age groups in Quebec. Women in the 25-29 age group displayed some duration dependence as the hazard rate decreased rapidly after the first 5-6 months on welfare. Men in the same age group had a decreasing hazard rate after approximately one year on welfare.

Barrett and Cragg (1998) found that the exit rate from welfare decreased with the amount of time that individuals spent on welfare in British Columbia. They showed that the exit rate from welfare fell sharply in the first three months, and kept falling for the next 24 months. They also showed that less than 40 percent of single persons and couples without children relied on welfare for more than 3 months. Yet, more than 33 percent of single mothers were on welfare for more than a year. After 4 years, about 12 percent of single mothers were still on welfare.

To summarize, most studies do not have the same findings concerning the effect of the welfare benefit on the pattern of welfare spells, although they seem to reach similar conclusions about the role of education on welfare dependence. A low level of education may be associated with low human capital and, thus, low job opportunities. This makes it more difficult for welfare recipients with a low level of education to gain their independence by working. As a result, welfare reforms in some countries have focused on education upgrading and employment and training programs.

2.3.2 Welfare Recidivism

Welfare recidivism may be common in societies with a generous welfare system. Bruce, Bailey, Cragg, Nakamura and Warburton (1993) investigated the pattern of British

Columbia welfare re-entry between 1983 and 1991 using administrative data. Their study defined welfare recidivists as those who had a welfare spell over the previous two years, dropped off welfare for at least one month and who subsequently returned to welfare.

Bruce *et al.* (1993) found that single males made up about half of all welfare recidivists. Single females and single parents accounted for 16 and 17 percent, respectively. About 35 percent of the welfare recidivists returned to welfare within 2 months, 50 percent within 4 months, and 85 percent within the first year. Bruce *et al.* found that single persons were short-term welfare users, but they were back on welfare relatively quickly. Approximately 35 and 42 percent of single male and single female welfare recidivists were below 25 years of age. A high proportion of the welfare recidivists who migrated from other provinces ("out of province" welfare recidivists) returned to welfare within 4 months. There was also evidence that some welfare recidivists combined the use of UI and welfare. These welfare recidivists received welfare benefits while waiting to be qualified for UI, and subsequently came back to welfare when their UI benefits were exhausted.

Barrett (1996) and Barrett and Cragg (1998), using the same data as Bruce *et al.* (1993), showed that there was a high incidence of repeated welfare use, especially within the first year after leaving welfare. Approximately 15 and 13 percent of single men and women, respectively, who were welfare recidivists returned to welfare after one month and 55 and 46 percent of single male and single female welfare recidivists went back after one year. About 51 percent of single mother welfare recidivists were back on welfare within a year. In addition, Barrett (1996) showed that the benefit rate had a large negative impact on the welfare exit rate for welfare recidivists, implying that the labour supply disincentive effect for welfare recidivists is larger than for average welfare recipients.

Unfortunately, the use of administrative data files limits the analyst's ability to control for the characteristics of welfare recidivists. For example, the above studies had no control for the age group or the level of education of welfare recidivists. If these variables are important determinants of welfare recidivism, their omission may have yielded biased results.

In the case of the AFDC program in the U.S., Blank (1994) showed that welfare recidivists were likely to be black, never married, have more children and/or have less unearned income. Blank and Ruggles (1996) pointed out that the AFDC recidivism rate among women with continuing eligibility when exiting welfare was almost twice as high (29 percent) as those whose eligibility had ended (15 percent).

The problem of welfare recidivism and its relation to on- and off-welfare spells was studied by Huang and Cardell (1996). Specifically, they estimated the hazard function for a two-state repeated duration model with unobserved heterogeneity, using data from the Washington State Family Independence program. They found a negative correlation between on- and off-welfare spells. A person with a longer on-welfare spell tended to have a shorter off-welfare spell, *i.e.*, this person was returning to welfare faster. Huang and Cardell showed that about 50 percent of women who were on welfare for 4 months stayed off welfare for a year or less and then returned to welfare. This proportion increased to 83 percent for women who were on welfare for 3 years.

Factors that affect welfare recidivism seem to be the same as those determining welfare duration dependence. This might suggest that there are some common factors such as race, marital status, number of children, and other sources of income that lead to both duration and occurrence dependence of welfare recipients. It is not surprising that personal characteristics of repeat welfare users are the same as single users. It is, however, surprising that a large proportion of welfare recipients are welfare recidivists. Future studies might usefully focus on what causes the high recidivism rate, and examine how to reduce it.

2.4 Welfare Reforms in Alberta[11]

Since the welfare reforms in Alberta provide a case study of the effect on welfare participation of administrative changes in Chapter 4, this section focuses on three interesting studies of the welfare reforms in Alberta: Boessenkool (1997), Canada West Foundation (1997), and Shillington (1998). The first study used macro data while the others used data from two separate telephone interviews. These three studies examined what happened to former welfare recipients after the 1993 welfare reforms in Alberta.

As mentioned before, a major conclusion from Boessenkool (1997) was that administrative changes mattered. Administrative changes in Alberta included an emphasis on welfare recipients returning to the workforce, tightened welfare eligibility and more fraud investigation, and welfare benefit reduction.

Boessenkool showed that administrative changes in Alberta reduced welfare caseloads significantly. This reduction was primarily accomplished by reducing new inflows into welfare, rather than by pushing individuals off the welfare rolls. During the

[11] A detailed discussion of the Alberta welfare reforms is provided in section 4.2 of Chapter 4.

second half of 1992, the number of opened caseloads per quarter was 37,000. This number fell to 25,000 in mid-1993 and to 20,000 by early 1996. Moreover, Boessenkool found that the majority of those prevented from gaining access to welfare were young employable individuals. In March 1993, about 26 percent of welfare recipients were under age 25. When the total caseload fell by 48 percent from March 1993 to March 1996, the number of welfare recipients under age 25 fell by 64 percent. Welfare recipients under age 35 made up 70 percent of the total caseload reduction.

Boessenkool then investigated what happened to former welfare recipients using macro data. He showed that there was little evidence that individuals who left welfare went to British Columbia, turned to a life of crime, or received federal employment insurance (EI) benefits. When the British Columbia government began tracking new welfare recipients from Alberta soon after the benefit reduction in Alberta in 1993, the data showed that British Columbia experienced only small changes in the flow of recipients from Alberta during the period from late 1993 to mid-1996. Regarding the crime rate in Alberta, Boessenkool showed that Alberta's property crime rate dropped by 24 percent between 1992 and 1994, the years in which the drop in welfare caseloads was greatest. Moreover, the data showed that the time spent by Albertans on EI fell throughout the 1993-95 period. Nonetheless, by using macro data, Boessenkool cannot determine whether former welfare recipients went onto the EI roll or not. A reduction in EI use could be because of the economic recovery in Alberta, and it is possible that EI use may have fallen further if former welfare recipients did not receive EI benefits.

Boessenkool concluded, however, that there was some evidence that former welfare recipients turned to federal and provincial employment and training (ET) programs or went back into the workforce. In 1993/94, AFSS transferred 11,000 welfare recipients to the Students Finance Board (SFB). The Students Finance Board provided grants or loans to those who were upgrading their education. There is little evidence that individuals directed to education returned to welfare. In addition, Boessenkool stated that, between 1993 and 1995, Alberta benefited more than did British Columbia (a province with similar economic prospects) from the Developmental Uses programs that were offered under EI. The number of Developmental Uses clients per thousand population in Alberta declined by 8 percent in 1994 but increased in 1995 while in British Columbia this number fell by 15 percent in 1994 and by a small amount in 1995.

Boessenkool asserted that Alberta's growing economy doubtless contributed to the reduction in the welfare caseload.[12] Boessenkool suggested that job growth in Alberta was strong enough to take up a substantial number of former or potential welfare recipients. However, the other provinces in Canada had never experienced a decline in their welfare caseload of the magnitude of Alberta's although some of them had had higher economic growth rates for longer periods of time than Alberta experienced from 1993-96.

Another study on welfare reforms in Alberta was completed by the Canada West Foundation (1997). The Canada West Foundation (CWF) conducted a telephone survey between February and April 1997. The survey interviewed 769 welfare recipients who had left welfare between September 1993 and October 1996. About 72.5 percent of

[12] This may also be the case for other countries such as the U.S. Ziliak, Figlio, Davis and Connolly (1997) showed that economic growth contributed to the AFDC caseload reduction in 1996 more than did welfare reforms.

respondents were not on welfare at the time of the survey, and, thus, about 27.5 percent were welfare returnees at that time. About 51.2 percent of respondents were single persons while an additional 30.2 percent were single parents. Single persons were over-represented, and single parents were under-represented compared to the distribution of welfare recipients by family type in the administrative data.[13] The CWF survey found that the majority of respondents were still living in poverty. About 60.4 percent of respondents had annual household incomes below $15,000 in 1996. Regarding the education level of respondents, the CWF found that about 40 percent of the sample had less than high-school education while respondents who were welfare returnees tended to have an education level below grade 10. In addition, about 45 percent of respondents reported that they went on welfare because they were unemployed while about 18 percent were on welfare because of insufficient income.

The major finding of the CWF survey is that being employed was the most common reason for leaving welfare. About 53 percent of the sample reported that they found a job when they left welfare. Of the respondents who were not on welfare at the time of the survey, about 48 and 17 percent were employed full-time and part-time, respectively. These proportions were 13 and 18 percent, respectively, for those who were on welfare at the time of the survey.

Even though former welfare recipients were employed, most of them were still struggling to meet their needs. The CWF showed that about 68 percent of respondents

[13] In 1996, about 44.5 percent of welfare recipients in the administrative data were single persons and about 38.5 percent were single parents (Shillington, 1998).

who were not on welfare at the time of the survey reported that they did not have enough money to meet their food and shelter needs at least once since leaving welfare. Of the same group, about 17 percent had used a food bank at least once since they left welfare while about 31 percent used the food bank at least once while they were on welfare. However, the situation was worse for those who returned to welfare. About 84 percent reported not having enough money to meet their food and shelter needs at least once since they went back on welfare. About 28 percent of this group used the food bank while they were off welfare while about 52 percent had used the food bank since they went back on welfare.

Since employment and training (ET) initiatives were a principal part of Alberta's welfare reforms, the survey by the CWF also included questions related to ET and education activities. The Canada West Foundation (1998) found that about 33 percent of the sample reported that they participated in an ET program after January 1993. About 42 percent of the sample attended school at some point between January 1993 and the time of the survey, and about 53 percent of these reported that they received a student loan or grant at some point. The survey also showed that about 37 percent of the respondents who were on welfare at the time of the survey had participated in an ET program at some point in time, whereas 32 percent of those who were not on welfare at the time of the survey had participated in ET programs. About 46 percent of those who were not on welfare at the time of the survey believed that ET program participation helped them get a job, but only 38 percent of those who had returned to welfare had the same opinion.

The last study of the 1993 welfare reforms in Alberta was done by Shillington (1998). Using data from a survey conducted by the Population Research Lab (PRL) at the

University of Alberta, he analyzed the participation in work and welfare of welfare recipients following the welfare reforms. The survey interviewed about 500 individuals who received welfare benefits or grants from the SFB during the period from January 1993 to December 1996. The survey sample appears to be representative of the population of welfare recipients in terms of gender and age, but not in terms of family type. Single persons seem to be under-represented in the sample. This bias in family type is opposite to that in the survey by the CWF. In addition, compared to the survey by the CWF, the survey by the PRL provided more information on the respondents' period and duration of welfare, work, and ET program participation.

Shillington (1998) showed that most respondents reported only one welfare spell during the 1993-96 period. Single persons were the major family type for respondents with one welfare spell, while single parents were the most frequent users (*e.g.*, they were on welfare more than 3 times or were on welfare for longer than 2 years during the same period). The average and median duration of a welfare spell were 10.2 and 3 months, respectively. As expected, more educated welfare recipients in Alberta reported a shorter welfare spell.

Since the reforms reduced the welfare benefit rate, social assistance benefits may not be adequate to meet household needs. Shillington showed that half of the respondents used a food bank at least once in the previous four years. Furthermore, even though the benefit rate in 1996 was lower than in 1993 (Table 4.4), the average number of times that a respondent visited a food bank was 3.6 visits in 1996 and 5.0 visits in 1993. Because of the inadequacy of welfare benefits, about 16 percent of respondents turned to relatives, friends, or religious groups for help.

Shillington indicated that the reforms in 1993 could have forced some recipients to seek employment that paid less than the welfare benefit rate. About 58 percent of all jobs held by respondents paid less than $1,000 a month, before taxes or deductions. In comparison, average monthly welfare payments in 1993 were $394 for single persons, $799 for single parents with one child, and $1,043 for couples with one child. In addition, Shillington showed that only 28 percent of respondents worked in 1993. This proportion increased to 44 percent in 1994, 57 percent in 1995 and 66 percent in 1996. About 65 percent of the jobs held by respondents were permanent jobs, an additional 24 percent were temporary jobs, and the rest were seasonal jobs.

Concerning the effect of ET programs on employment, Shillington showed that the number of days employed for ET participants increased after they completed or left ET programs. However, the differences between the number of days employed in each year between 1993 and 1996 for ET participants and non-participants were not statistically significant. The data also indicate that the number of months on welfare before and after individuals participated in ET programs did not differ. This might indicate that ET programs did not help ET participants get more work or become independent of welfare.

The findings in Boessenkool (1997) lead to the important conclusion that administrative change is crucial and very effective in controlling the number of welfare recipients. However, using macro data has some limitations. To evaluate the effect of the reforms on welfare recipients more precisely, it may be necessary to analyze micro data. The studies by the Canada West Foundation (1997) and Shillington (1998), which both use micro survey data, provide more detailed information on the effect of the reforms on welfare recipients. Even though the questionnaires conducted by the CWF and PRL overlapped to some extent, the questions asked by the PRL were more informative in the area of the dynamics of welfare, work and ET program participation. The study by Shillington that used this data summarized the evidence of the survey, but did not formally investigate the factors that affect welfare and employment participation or welfare duration. Moreover, this study did not pay enough attention to ET programs even though they were one of the main tools of the Alberta welfare reforms in 1993.

2.5 Evaluation of Employment and Training programs

Since we examine the effect of employment and training (ET) programs in Chapter 4, this section discusses some studies of the effect of ET programs in the U.S. and Canada. There are a large number of studies on the evaluation of government ET programs for low-income individuals. Many studies were reviewed in Friedlander, Greenberg, and Robins (1997). ET programs included in their review were government funded training programs for economically disadvantage people in the U.S. In our review, we will not discuss the details of ET programs in the U.S. since there are many programs, each of which is different. Moreover, the details of many programs are already provided in Friedlander *et al.* (1997).

Friedlander *et al.* (1997) indicated that economists had done surprisingly little work toward developing a complete theory of ET program evaluation. However, they concluded that, in general, the current knowledge of government training programs for the disadvantaged indicates that these programs had produced modest positive effects on employment and earnings for adult men and women. They added that the positive effects for adults were not large enough to produce a substantial effect on welfare use. Their conclusions were reinforced by an evaluation of ET programs in British Columbia (B.C. Ministry of Social Services, 1992).

Following Friedlander *et al.* (1997), this review separates ET programs into voluntary and mandatory programs. A voluntary program is an ET program that provides training for individuals who apply for it. Main activities in voluntary ET programs include paid work experience, unpaid work experience, on-the-job training and classroom training. Mandatory ET programs are often directed at public assistance recipients. The main activities in mandatory ET programs are job search training and assistance, unpaid work experience, and classroom training. A program's mandatory nature stems from its statutory authority to penalize recipients who do not cooperate by reducing or terminating their welfare payments. However, Friedlander *et al.* (1997) stated that in the U.S. most of the program activities in voluntary and mandatory ET programs were similar and the institutions providing the training could be the same. They also added that enforcement among mandatory programs was often downplayed by local program administrators, making participation seem voluntary.

Table 2.4 shows the evaluation of training programs administered for AFDC recipients as reported in Friedlander *et al.* The difference in mean annual earnings of treatment groups (*i.e.*, those who participated in ET programs) and control groups (*i.e.*, those who did not participate in ET programs) ranges from \$438-\$1,849.[14] Since each

[14] 1996 US dollars.

program included a different activity, its effect on earnings varied to some degree. However, voluntary programs seem to have had a larger positive effect.

Recently, the Canadian federal government and the provincial governments of British Columbia and New Brunswick have initiated employment and training programs. The B.C. Ministry of Social Services (1992) evaluated the effectiveness of the ET programs in British Columbia while Milne (1995) provided descriptions and comments on New Brunswick's ET demonstration programs (*i.e.*, NB Works).[15]

The B.C. Ministry of Social Services established employment and training programs in 1986 in order to help welfare recipients improve their skills and re-enter the workforce. These programs include the Employment Opportunity Program, public employment programs, a classroom training program, and a job search program. The Employment Opportunity Program subsidizes the wages of persons who have been receiving welfare benefits and who work full-time for two to six months. The employers of participants in this program must provide on-the-job training. Public employment programs offer welfare recipients employment with on-the-job training on government projects. Wages are funded by the B.C. Ministry of Social Services and jobs last about 6-12 months. Classroom training programs include Vocational Training, Career Technical Training, Adult Basic Education, and university training courses. A job search program,

---

[15] The federal government and the New Brunswick government also initiated another two demonstration projects: The Self-Sufficiency Project (SSP) is a wage supplementation demonstration project and NB Job Corps is a workfare demonstration project. The SSP was also established in B.C. However, these programs are not an ET program and, thus, they are not reviewed here. An evaluation of the B.C. Self-Sufficiency Project is given in Card *et al.* (1996).

Job Action, combines classroom training with actual job search and lasts 5 weeks. About 13 percent of welfare cases in British Columbia participated in one of the ET programs (B.C. Ministry of Social Services, 1992).

The B.C. Ministry of Social Services (1992) interviewed ET participants 17 months after they had entered the ET programs. Employment, earnings and welfare use of ET participants and comparison groups were compared by a cell-matching method. The comparison groups were selected by asking program referral staff to select welfare recipients whom they would have referred to one of the ET programs had there been openings available.

Using the cell-matching method, the B.C. Ministry of Social Services classified ET participants and the comparison groups into 350 cells (categories). The classification is based on five sex and marital status classes, two employability classes, five age classes, and seven welfare duration classes. The estimate of the impact of an ET program is the difference between the outcome measures for ET participants and the comparison groups in the same cells or with the same characteristics.

A very important conclusion from the B.C. Ministry of Social Services (1992) study was that the Employment Opportunity Program and public employment programs that provided on-the-job training did not increase participants' earnings. As participants in these programs were employed, the programs increased Unemployment Insurance (UI) eligibility in the short-term and encouraged UI dependence, especially during the 12 month eligibility period following the end of the programs. These ET programs reduced welfare dependence only in the short-term. Only the Employment Opportunity Program helped participants find employment in the long-term.

Concerning the evaluation of classroom training programs, the B.C. Ministry of Social Services (1992) indicated that, rather than having a positive impact on welfare dependence, these programs actually had a small negative impact. That is, these programs led to additional welfare dependence. On the contrary, the job search program seemed to reduce welfare dependence and helped participants find employment successfully. However, this program had no effect on the wage rate.

In New Brunswick, the NB Works program was launched in 1992. The welfare recipients targeted by this program are between 18 and 45 years of age, have received benefits for 6-12 months, are entitled to higher levels of welfare benefits (*e.g.*, single mothers and two-parent families), have a low educational attainment (*e.g.*, grade 7-12 education), have little labour force attachment, and are assessed as having great potential for success in the program. NB Works is a long period program, lasting as much as 49 months. The initial phase is a five-month period of employment. The second phase is for literacy and other academic upgrading which can take up to 24 months. This is followed by nine months of skills training and three months of job search assistance. Finally, the program may end with up to eight months of subsidized job placement in the private sector. Of the first group of program participants, 72 percent were single parents, 76 percent were women, and 80 percent were under age 35 (Milne, 1995).

Milne (1995) stated that NB Works could not be evaluated on a scientific basis and, consequently, would be of only limited use in shaping the national social assistance program. There was no experimental design for control groups and participants were chosen according to their potential for success. When participants dropped out, new participants were chosen to replace the former participants. Moreover, there is no record of whether participants dropped out because of personal problems or because of the program's problems.

Milne (1995) concluded, however, that NB Works is too expensive. The estimated program cost per participant is $59,000. This cost could be higher if not all participants are successful.

The evidence from Canada shows that ET programs have little effect or no effect on participants' earnings. In addition, ET programs have not been found to reduce welfare use in the long run.

2.6 Conclusions

A general purpose of the welfare participation literature is to identify the roles of individual and household characteristics, welfare parameters, and labour market variables in determining welfare participation, both in static and dynamic models. Individual and household characteristics such as age, gender, the level of education, visible minority status and family status affect welfare and work decisions through taste/distaste for welfare and work. Welfare parameters such as the benefit rate and the welfare tax rate, and labour market variables such as the wage rate have an impact on the welfare participation decision through a change in an individual's budget.

One factor that has been missing in the welfare participation literature is the role of administrative discretion/change. This role is important when welfare programs are administered by provincial governments and when welfare administrators have the authority to decide who shall receive welfare. Because of this role, welfare participation may not be free of the supply constraint.

Administrative changes can include welfare reforms such as a benefit reduction, a more restrictive welfare eligibility requirement, or ET program initiatives. Welfare reforms are mainly implemented to improve a welfare system and, probably, to lower the burden on taxpayers. Administrative changes such as ET initiatives can affect welfare recipients in many ways. However, the interesting questions are how ET program participation affects welfare and work participation; and, to the extent that ET programs aim to improve the human capital of welfare recipients, whether participation in ET programs affects earnings.

To fill a gap in the welfare participation literature, we examine the role of administrative selection in determining welfare participation (Chapter 3) and investigate the effect of ET programs (as a main component of the 1993 Alberta welfare reforms) on welfare recipients' welfare/work decisions and earnings (Chapter 4).

Table 2.1 Static Models of Welfare Participation

Model	Method of Estimation
Single Equation $P_i^* = X_{1i}\beta_1 + \varepsilon_{1i}$	Allen (1993) estimated β_1 by a logit regression. Charette and Meng (1994), and Dooley (1996) estimated β_1 by a probit regression.
Simultaneous Equations $P_i^* = f(X_{2i};\beta_2) + \varepsilon_{2i}$ $H_i^* = f(X_{3i};\beta_3) + \varepsilon_{3i}$ if $P_i^* > 0$ $H_i^* = f(X_{4i};\beta_4) + \varepsilon_{4i}$ if $P_i^* \leq 0$	Moffitt (1983) and Blank (1985) estimated β_2, β_3 and β_4 jointly. These equations were derived from utility maximization. The specifications of $f(\cdot)$ depend on the form of the utility function.
$P_i^* = f(X_{5i};\beta_5) + \varepsilon_{5i}$ $FS_i^* = f(X_{6i};\beta_6) + \varepsilon_{6i}$	Bassi (1990) estimated β_5 and β_6 jointly.
$P_i^* = X_{7i}\beta_7 + \varepsilon_{7i}$ $LF_i^* = X_{8i}\beta_8 + \varepsilon_{8i}$	Christofides *et al.* (1997) estimated the reduced form equations for P_i^* and LF_i^* jointly.
Multinomial Discrete Choices $\Pr(d_{ij} \mid X_i, \beta) = \Pr(U_{ij} > U_{ik} \mid X_i, \beta)$ $\forall j \neq k$	Keane and Moffitt (1998) estimated twenty-four work-welfare combinations by Simulated Maximum Likelihood and a Method of Simulated Moments. Bingley and Walker (1997) estimated four work-welfare choices using a multinomial Probit switching regression model. Smith (1997) estimated six work-welfare choices by maximum likelihood.

Note: Variable P_i^* is the utility (U_i) difference between being on and off welfare. If $P_i^* > 0$, $P_i = 1$ indicating a welfare recipient. If $P_i^* \leq 0$, $P_i = 0$ for a non-recipient of welfare. Variable H_i^* is hours of work. The variable FS_i^* represents the utility difference between participating and not participating in the US Food Stamp program where FS_i equals one if the individual participates in the Food Stamp program and zero otherwise. Variable LF_i^* determines labour force participation. If $LF_i^* > 0$, $LF_i = 1$ and an individual is in the labour force. If $LF_i^* \leq 0$, $LF_i = 0$ and an individual is out of the labour force. The expression $\Pr(d_j|X,\beta)$ is the probability of choosing work-welfare option j (d_j) conditional on a vector of observed characteristics and unknown parameters, where $d_j = 1$ iff $U_j \geq U_k$ $\forall j \neq k$. The *Xs* are vectors of exogenous variables, the *βs* are vectors of parameters, and the *εs* are error terms.

Table 2.2 Welfare Participation: Incentive and Disincentive Effects

Study	Data set	Sample	Effects on welfare participation
Single Equation			
Allen (1993)	1986 census of Canada	Women with low income	liquid asset exemption (+), B as % of provincial poverty line (+)
Charette and Meng (1994)	1989 LMAS	Unmarried female heads of households with no more than two children.	w(-), N(-), B(+), I_a(+), t-ins.
Dooley (1996)	SCF (1973, 1975, 1979, 1982, 1989, 1990, 1991)	Lone mother with children of age below 18.	w(-), B(+), I_a(+), t-ins.
Simultaneous Equations			
Moffitt (1983)	1976 PSID	Female headed households with no spouse present, excluding persons with high non-wage income.	w(-), t(-), B(+)
Blank (1985)	1979 Current Population Survey	Female headed households with children present, excluding persons with nonlabour income above $5,000.	w(-), t(-), B(+)
Bassi (1990)	1981 PSID	Female headed households who have children below 18 years of age.	net income from welfare (+)
Christofides *et al.* (1997)	1989 LMAS	Single Males	B(-), t(+), w(-)
		Single Females	B(-), t-ins., w(-)
		Lone fathers	B(-), t-ins., w-ins.
		Lone Mothers	B-ins., t-ins., w(-)
Multinomial Discrete Choices			
Keane and Moffitt (1998)	1984 SIPP	Female heads of household with age between 18-64 who have children of age below 18 and own assets below $4,500.	w(-), t(-)
Smith (1997)	PSID (1978, 1980, 1982, 1984)	Able-bodied female heads of household of age under 60.	w(-), t(-), B(+)
Bingley and Walker (1997)	Family Expenditure Survey (1978-92)	Lone mothers	B(+)

Note: B = the welfare benefit, w = the wage rate, t = the welfare tax, N = nonlabour income, I_a = the earned income exemption, (+) = positive effect on welfare participation, (-) = negative effect on welfare participation, ins. = insignificant at the 5 percent level.

Table 2.3 Studies of Welfare Dependence

Study	Data Set	Sample size	Control for hetero-geneity	Mean spell length
Barrett and Cragg (1998)	BC social services administrative data (January 1980 to December 1992)	164,894 employable spells, 41,032 unemployable spells	No	n.a.
Blank (1989)	SIME/DIME	508 spells	Yes	13.3 months
Blank and Ruggles (1996)	SIPP (October 1985 to April 1989)	3,507 spells	No	Eligibility spells: 5 months Participation spells: 8 months
Bruce *et al.* (1993)	BC social services administrative file (November 1983 to September 1991)	Single persons, one-parent families, couples and two-parent families	No	n.a.
Fortin and Lacroix (1997)	Quebec social services administrative file (January 1979 to December 1993)	83,392 spells	Yes	(For age group 18-24, 25-29 and 30-45, respectively) Women: 14.7, 25.3, 35.93 months Men: 11.2, 12.1, 23.2 months
Harris (1993)	PSID 1984-86	401 spells	No	8.7 months for recipients who exit welfare when getting a new job. 9.3 months for recipients who work off welfare.
Hoynes (1996)	LDB (January 1987 to December 1992)	12,221 spells	No	11.9 months
Huang and Cardell (1996)	Washington State Family Independence Program (June 1987 to May 1992)	415 on-welfare spells, and 526 off welfare spells	Yes	On-welfare spell: 15.7 months Off-welfare spell: 11.1 months
O'Neill *et al.* (1987)	NLSY women 1968-80	2,256 spells	No	n.a.
Sandefur and Cook (1997)	NLSY 1979-93	1,268 spells	Yes	Median: 25-36 months

Note: LDB = California's Longitudinal Database, NLSY = National Longitudinal Survey of Youth, PSID = Panel Study of Income Dynamics, SIME/DIME = Seattle/Denver Income Maintenance Experiment, SIPP = Survey of Income and Program Participation.

Table 2.4 Evaluation of Training Programs for AFDC Recipients

program (# of studies)	Experimental evaluation	Years of Operation	Mean Annual Effect US$	Range of Effects on Earnings (if more than one) (# negative and stat. sig./# negative and not stat. sig./# positive and not stat. sig./# positive and stat. sig.)
		Voluntary Programs		
SW (2)	yes	1975-1978	1,309	554-2,064 (0/0/1/1)
HHA (1)	yes	1983-1986	1,849	209-3,749 (0/0/2/5)
TOPS (1)	yes	1983-1986	1,448	(0/0/0/1)
NJGD (1)	yes	1984-1987	1,017	(0/0/0/1)
MFSP (1)	yes	1982-1988	793	108-1,722 (0/0/3/1)
ET (1)	no	1983-1989	999	(0/0/0/1)
		Mandatory Programs		
WIN-JS/WE (7)	yes	1967-1989	438	–56-813 (0/1/1/5)
WIN-MIXED (2)	yes	1982-1987	728	710-746 (0/0/0/2)
JOBS (4)	yes	1989-1996	444	88-1,145 (0/0/4/7)

Source: Compiled from Tables 1 to 4 in Friedlander, Greenberg and Robins (1997).

Notes: Program effects are in 1996 dollars. Because of methodological differences and other factors, not all the studies in this table should be considered on equal footing. Evaluations shown in this table include adult women only. SW = National Supported Work Demonstrations. HHA = AFDC Homemaker-Home Health Aide Demonstrations. TOPS = Maine Training Opportunities in the Private Sector Program. NJGD = New Jersey Grant Diversion Project. MFSP = Minority Female Single Parent Demonstration. ET = Massachusetts Employment and Training Choices Program. WIN-JS/WE = Work Incentive Program emphasizing supervised job search and work experience. WIN-MIXED = Work Incentive Program incorporating education and/or training. JOBS = Job Opportunities and Basic Skills Training Program.

CHAPTER 3

THE ROLE OF ADMINISTRATIVE SELECTION IN CANADIAN WELFARE PARTICIPATION

3.1 Introduction

Social assistance programs in Canada aim to provide incomes to people whose other financial resources have been exhausted. The amount of social assistance or welfare is set to cover the cost of basic requirements. However, when welfare benefits are high enough to cover the cost of living, they may deter people from working and, consequently, cause them to depend on welfare. Welfare recipients may also be discouraged from working because part of their earnings from work is clawed back by reducing their welfare benefits. Because the structure of the welfare system may discourage work and encourage welfare dependence among some welfare recipients, administrative discretion may be used to prevent those who are able, but unwilling to work, from receiving welfare.

Under the Constitution Act of 1982, each province is responsible for the design and administration of its own social assistance program. Provincial social service administrators have full authority to use their discretion to control the number of welfare recipients and the total cost of welfare. Therefore, administrative discretion may be an important determinant of who receives welfare and of the level of benefits a welfare recipient receives.

In previous studies of welfare participation, two types of costs were included as determinants of the welfare participation decision: non-pecuniary and pecuniary costs. Non-pecuniary costs include time costs, transaction costs, information costs, and stigma costs, all of which reduce the attractiveness of welfare. These costs were assumed to be determined by personal and household characteristics and the unemployment rate. For example, Moffitt (1983) concluded that being young, having a large family, or living in a high unemployment rate state reduced welfare stigma for single mothers and increased participation in the Aid to Families with Dependent Children (AFDC) program. Blank (1985) and Smith (1997) found that education and race were significant determinants of the non-pecuniary costs of AFDC participation. In their analyses of Canadian welfare participation, Allen (1993), Charette and Meng (1994), and Dooley (1996) showed that older and more educated women had higher non-pecuniary costs and, thus, were less likely to receive welfare payments. In contrast, Christofides *et al.* (1997) showed that older single males and females tended to have lower non-pecuniary costs and, thus, were more likely to be on welfare than younger individuals.

The pecuniary factors that may be associated with incentive and disincentive effects of welfare participation include changes in the wage rate, the welfare benefit rate, the welfare tax rate (or claw back rate), and the level of the earnings exemption. A higher wage rate may induce low-income households to work more if the substitution effect is stronger than the income effect. In this case, the wage increase, by causing an earnings increase, makes welfare less attractive. Moffitt (1983), Blank (1985), Charette and Meng (1994), Dooley (1996), Keane and Moffitt (1998), Christofides *et al.* (1997), and Smith (1997) all showed that a higher wage rate reduced welfare participation except for the case of single fathers in which the wage rate had an insignificant effect (Christofides *et al.*, 1997).

Both a higher welfare benefit and an increase in the level of earnings exempted from the welfare tax increase the incomes of welfare recipients and, thus, may make welfare more attractive. Moffitt (1983), Blank (1985), Bassi (1990), Allen (1993), Charette and Meng (1994), Dooley (1996), Smith (1997), and Bingley and Walker (1997) showed that a higher benefit rate induced more welfare participation. However, Christofides *et al.* (1997) found that a higher benefit rate had no effect on the welfare participation decision for single mothers, but had a negative effect for single persons and single fathers.

By allowing some earnings to be exempted from the welfare tax, welfare programs aim to encourage welfare recipients to work and, consequently, to gain self-sufficiency. However, the earned income exemption may also induce the working-poor to earn extra income by participating in the welfare program. Charette and Meng (1994) and Dooley (1996) found that a higher earnings exemption increased welfare participation.

The welfare tax rate or clawback rate is the rate at which welfare payments are reduced when labour income exceeds the earnings exemption. This tax discourages work by welfare recipients since it reduces the effective wage rate. In addition, if the clawback exceeds the welfare benefit, a working-recipient will become ineligible for welfare. Moffitt (1983), Blank (1985), Keane and Moffitt (1998) and Smith (1997) showed that a higher tax rate reduced welfare participation of single mothers. Charette and Meng (1994), Dooley (1996) and Christofides *et al.* (1997), on the other hand, showed that a higher tax rate did not have a significant impact on welfare participation of single females, single mothers or single fathers.

The literature on Canadian welfare participation (*e.g.*, Allen (1993), Charette and Meng (1994), Dooley (1996), and Christofides *et al.* (1997)) did not take into account two important factors that may affect welfare participation. These two factors are the needs test that determines welfare eligibility and welfare administrative discretion. The needs test disqualifies some households from being eligible for welfare.[1] Any change in welfare policy may not affect the welfare decisions of these ineligible households (provided they remain ineligible), although it may affect the welfare decisions of eligible households. The inclusion of ineligible households in the analysis of welfare participation might alter the estimated parameters. For example, an increase in the welfare benefit might not affect the welfare decisions of ineligible households. Therefore, the inclusion of a large number of ineligible households in the sample might change the magnitude and the significance of the parameter estimate on the welfare benefit in a welfare participation equation.

Moreover, the studies cited above, which include only the non-pecuniary and pecuniary costs of welfare participation, can only explain the decision by individuals to collect welfare. Boessenkool (1997) studied the factors that affect welfare caseloads and showed that administrative changes accounted for most of the variation in welfare caseloads in Alberta during 1993-96 and in British Columbia during 1991-95.

---

[1] The details of the needs test are presented in Appendix B.

Clearly, welfare participation in Canada could be the result of decisions made by both individuals and welfare administrators. Individuals, who have exhausted their own financial resources, decide whether to apply for welfare. Welfare administrators then select from among eligible welfare applicants according to criteria that may not be known by applicants. Thus, administrative selection, which is one form of administrators' discretion, may prevent eligible applicants from receiving welfare. Specifically, not all eligible individuals (or low income individuals) are selected for welfare. An eligible individual who has a high potential for self-sufficiency may be less likely to be selected for welfare by administrators. Consequently, the actual welfare take-up rate involves both demand (the applicant) and supply (the administrator) sides. In other words, welfare participation is not purely a choice of welfare applicants, but may be constrained by the supply side decision.

This paper develops a welfare participation model which takes into account both demand and supply of welfare factors. Within this framework, the impact on individual welfare decisions of the non-pecuniary and pecuniary costs and benefits of being on welfare are examined. Moreover, factors that may influence potential administrative selection (*e.g.*, an individual's potential income, provincial per-capita income, labour market conditions, and a fiscal variable) are also included in the model and empirical analysis.

Previous studies on welfare participation in Canada have employed annual data. For example, Allen (1993), Charette and Meng (1994), and Christofides *et al.* (1997) used cross-section data for a particular year, and Dooley (1996) used a pooled cross-section time-series of annual income and welfare status data. Using annual welfare status data may distort some parameter estimates. For example, individuals who were on welfare for one month and individuals who were on welfare for twelve months have the same welfare status in an annual data set (on or off welfare in a particular year). Further, monthly wage rates (and welfare benefits) for individuals who were on welfare for one month and for individuals who were on welfare for 12 months may not be significantly different in the month that they were on welfare, but the annual average wage rates of the two groups may differ substantially. Thus, using the annual average wage rate instead of the monthly wage rate may misrepresent the effect of the wage rate on the individual's welfare decision. In addition, any changes in the provincial benefit rate that occur during the year may have little effect on welfare decisions (as in Christofides *et al.* (1997)) if annual data are used. The use of annual data blurs the impact of the benefit change.

The empirical analysis in this paper uses monthly welfare status and the monthly wage rate from the 1988-90 Labour Market Activity Survey (LMAS). Monthly welfare status, earnings, and hours of work, as reported in LMAS, are transformed into a pooled cross-section time-series data set. Each observation in this new data set contains an individual's characteristics, welfare status, earnings, and hours of work in a particular month. By doing this we can compute whether an individual is eligible for welfare in each month and can estimate the determinants of welfare participation in a given month.

The determination of an individual's welfare eligibility is an important issue since welfare is not an option for ineligible individuals. In this study, welfare eligibility is determined on a monthly basis. Each month, an individual's earnings and expected welfare benefit are used to determine their eligibility status. If an individual's net earnings (net of the welfare tax) are less than the welfare benefit rate (associated with his/her household type), he/she is deemed eligible for welfare. On the other hand, he/she is not deemed eligible if his/her net earnings are greater than the welfare benefit rate.

Since eligibility is a necessary condition for taking up welfare, the empirical study in this paper will analyze welfare participation using data on eligible individuals only. This is similar to Allen (1993) who only included low-income women in his study. However, for comparison purposes we will also use a sample that includes both eligible and ineligible individuals. Results from the two sample sets will be compared, and the importance of eligibility for welfare participation will be addressed.

Some studies, such as Charette and Meng (1994), and Dooley (1996), included only single-mother families in their studies. In this study, we follow Christofides *et al.* (1997) by including both males and females from single person and single parent families. The importance of single males and females for the welfare caseload has been emphasized in Barrett and Cragg (1998). They showed that single males and females accounted for 38 percent of all caseloads in British Columbia during 1980 and 1982. This proportion rose to 64 percent during 1991 and 1992. Moreover, the National Council of Welfare (1998) showed that about 55 percent of welfare recipients in Canada in 1996 were single persons.

The next section of the paper provides the theoretical background, including the formation of the model and its predictions. Section 3.3 describes the functional form and the econometric method. Section 3.4 describes the data used in the empirical analysis, and is followed by a discussion of the empirical results in section 3.5. The last section provides conclusions.

3.2 Theoretical Background

The model of welfare participation developed in this study is based on sequential decisions. First, a low-income individual, who knows that he/she is eligible for welfare (given the fixed and liquid asset requirements), decides whether to apply for welfare. If an individual's utility gain associated with the higher income from being on welfare is greater than his/her utility loss resulting from the non-pecuniary costs of being on welfare, such as the stigma cost, the eligible individual will apply for welfare. Whether he/she receives welfare depends on the judgment of welfare administrators. The administrators determine who will receive welfare by selecting individuals from the pool of eligible applicants according to certain criteria.

This section will describe a static model of welfare participation that allows administrative discretion (*i.e.*, administrative selection) to have a role in the granting of welfare. Since welfare eligibility as determined by the needs test is a necessary condition for welfare participation, the following sub-section gives a brief explanation of eligibility requirements. A general model of welfare participation without administrative discretion is then discussed and the predictions from this model, in terms of the expected effects on welfare participation of changes in key variables, are made. Subsequently, the model is extended by adding administrative selection, and the predictions from this extended model are determined.

3.2.1 Welfare Eligibility

Welfare eligibility and entitlement are determined from a needs test and a household's budgetary deficit assessment. The needs test consists of an *asset test* and an *income test* (or liquid asset test). Basically, a welfare applicant is allowed to retain a small amount of fixed assets (called *the fixed assets exemption*). An applicant who has fixed assets above the exempted level is ineligible for welfare. An applicant who is eligible according to this assets test is then assessed using the income test—that is, the applicant's liquid assets less the earnings exemption (their *non-exempted assets*) are compared with the welfare benefit. The non-exempted assets in excess of the welfare benefit are deemed to be available for the applicants' current maintenance. If a household's non-exempted assets fall below its potential welfare benefit (*i.e.*, a household has budgetary deficit), it is eligible for welfare and is entitled to a benefit equal to the amount that their non-exempted assets fall short of the welfare benefit.

Liquid assets are evaluated differently depending on whether they are earned or unearned. Unearned income, such as worker's compensation, pension payments, and alimony payments, reduce the welfare benefit one for one (they are 100 percent taxed back or clawed back). However, a fixed amount of earned income is exempt from being taxed back (the earnings exemption), and earned income above the exemption level is taxed back at a rate that is below 100 percent.

Welfare eligibility is calculated on a monthly basis. Households are ineligible for welfare in a month in which they have non-exempted assets above the welfare benefit. Some provinces (*i.e.*, Nova Scotia, Manitoba, Saskatchewan, and Alberta) do not allow for an earned income exemption in the initial calculation of eligibility. In these provinces, earned and unearned incomes are taxed back at the same rate (100 percent) in the first month (in the first three months for Saskatchewan). However, after the first month of welfare receipt, the earned income exemption and a lower welfare tax rate are applied.

3.2.2 The General Model of Welfare Participation

When welfare is not available, or is not part of an individual's opportunity set, individual utility (U_i) is a monotonic, strictly quasi-concave function of leisure (ℓ_i) and the consumption of a composite commodity (C_i), $U_i = U(\ell_i, C_i)$. The budget constraint of the individual is $C_i \leq Y_i = w_iH_i + N_i$, where Y_i is total income and the price of the composite commodity is normalized to one. Labour income is a product of the wage rate, w_i, and hours of work, H_i, and $H_i = T - \ell_i$, where T is total time available. Non-labour income is N_i, which includes unearned income such as worker's compensation, pension payments, and alimony payments.

i) Preferences When on Welfare

When welfare is one of the individual's possible choices, the individual's utility function is assumed to have the form:

(3.1) $U_i = U(\ell_i, C_i) - \phi_i P_i$,

where P_i, a dummy variable representing welfare participation, equals one if individual *i* is on welfare and equals zero otherwise. The distaste for welfare or the non-pecuniary cost of being on welfare (ϕ_i) represents stigma, the term used by Moffitt (1983), or the feeling that receiving welfare is disgraceful. We assume that the non-pecuniary cost of being on welfare (ϕ_i) enters an individual's utility function by reducing the utility gained from leisure and consumption. Thus, when P_i equals one, the individual's utility from leisure and consumption falls by ϕ_i. The non-pecuniary cost of being on welfare or welfare stigma is assumed to be a random variable that depends on observed individual and household characteristics and unobserved factors (which will be described subsequently), and is expected to be positive.

ii) The Budget Constraint When on Welfare

The budget constraint when welfare is a choice is given by:[2]

(3.2) $C_i \leq Y_i = w_i H_i + N_i + P_i B_i,$

where B_i, the welfare benefit, is defined as:

(3.3) $B_i = \max\{0, B_i' - N_i - \max\{0, t(w_i H_i - I_x)\}\}.$

In equation (3.3), B_i' is the basic welfare benefit rate (the "cash" benefit rate for a welfare recipient who does not work and has no non-labour income), and I_x is the earnings exemption which is fixed amount of earnings that welfare recipients can keep before their benefits are reduced or clawed back. When welfare recipients work, only earned incomes in excess of I_x will be taxed at rate t. On the other hand, non-labour income (N_i) reduces the amount of the welfare benefit dollar for dollar. Thus, the welfare benefit is defined as the basic welfare benefit (B_i') minus non-labour income (N_i) and minus the clawback ($t(w_i H_i - I_x)$).

In Figure 3.1, when hours of work equal the distance $T\ell_1$ (hours of leisure = ℓ_1), earnings are equal to $w_i(T - \ell_1)$ which is equivalent to the earnings exemption (I_x). When hours of work equal the distance $T\ell_2$, earnings are equal to $w_i(T - \ell_2)$ and total income is $w_i(T - \ell_2) + N_1$, in which N_1 is the individual's initial non-labour income. At point ℓ_2,

---

[2] This definition of income does not account for unrecorded income and income taxes or any tax-related transfers. If welfare administrators observed unrecorded income, the number of people eligible for welfare could possibly be lower. In addition, welfare income is a non-taxable benefit. For most welfare recipients, non-welfare income may be non-taxable since total income is very low.

total income is equivalent to the basic welfare benefit ($B'_i = w_i(T - \ell_2) + N_1$). Finally, when hours of work equal the distance $T\ell_3$, earnings are equal to $w_i(T - \ell_3)$ and the welfare benefit is zero. At this break-even hours of work (point ℓ_3), the income clawback equals the welfare benefit ($B'_i = N_1 + tw_i(T - \ell_3) - tI_x$). Thus, households who work more than $T - \ell_3$ hours will never choose to be on welfare.[3]

For a welfare non-recipient, the individual budget line is N_1Y_1. Income with zero hours of work (leisure = T) is TN_1 (which is non-labour income), and the slope of the budget line is the negative of the wage rate ($-w_i$).

The opportunity set $N_2L_2M_2Y_1$ of a welfare recipient is nonconvex as shown in Figure 3.1. Welfare recipients who do not work have total income TN_2 which equals non-labour income (TN_1) plus the net welfare benefit ($N_2 - N_1$). The amount of non-labour income TN_1 reduces the welfare benefit dollar for dollar. If welfare recipients work less than $T - \ell_1$ hours, their labour income, non-labour income, and net benefits are added to obtain their total income (budget segment N_2L_2). When their earnings exceed the earnings exemption (I_x) at point L_2, where hours of work equal the distance $T\ell_1$, earnings

---

[3] According to the income test, households in Newfoundland, Prince Edward Island, New Brunswick, Quebec, Ontario and British Columbia with levels of the income clawback below the net benefit ($H_i < T - \ell_3$) are eligible for welfare. In contrast, households in Nova Scotia, Manitoba, Saskatchewan and Alberta with incomes below the basic benefit ($H_i < T - \ell_2$) are eligible for welfare. Welfare regulations in these four provinces do not allow any earnings exemption (I_x) in the calculation of initial eligibility. As a result, eligible applicants in these provinces are expected to have lower hours of work. However, after a month on welfare, welfare recipients in these provinces can retain the earnings exemption.

in excess of I_x are taxed back at rate t. This makes the budget segment L_2M_2 flatter, with a slope of $-w(1-t)$. With higher earnings, welfare recipients face a larger clawback. A welfare recipient will leave welfare when the clawback is equal to or larger than the welfare benefit (at break-even point M_2). Note, however, that the budget segment $N_2L_2M_2$ only applies to individuals who are eligible for welfare.

Generally, the welfare benefit in most provinces is defined as in equation (3.3), in which income in excess of the earned income exemption, $(w_iH_i - I_x)$, is taxed at rate t. Yet, there are some provinces (such as Newfoundland and Saskatchewan) that impose a maximum level of the earned income exemption, $\max I_x$. This situation is illustrated in Figure 3.2. As in the other provinces, the earnings below the initial exemption (I_x) are exempt from the welfare tax (budget segment N_2L_2). Labour income above I_x is taxed at rate t (budget segment L_2L_3). However, once the untaxed part of total earnings (the earnings exemption) reaches $\max I_x$ (that is, in Figure 3.2, total earnings reach the level Imax), additional earnings are taxed back at a rate of 100 percent (budget segment L_3L_4). In Figure 3.2, the budget line for eligible households that choose to be on welfare is $N_2L_2L_3L_4Y_1$. Thus rather than (3.3), the benefit equation with a maximum earnings exemption has the form:

(3.4) $B_i = \max\{0, B_i' - N_i - \max\{0, t\,(w_iH_i - I_x), w_iH_i - \max I_x\}\}$[4].

In a province where there are multiple welfare tax rates (*e.g.*, Alberta had three welfare tax rates before 1993), the benefit equation is:

[4] The clawback term $(w_iH_i - \max I_x)$ is obtained as the sum of the tax on earnings in excess of I_x, $t(w_iH_i - I_x)$, and the earned income in excess of the maximum exemption, $I_x + (1-t)(w_iH_i - I_x) - \max I_x$.

$$(3.5)\quad B_i = \max\{0, B_i' - N_i - \max\{0, t_1(w_iH_i - I_{x1}), t_2(w_iH_i - I_{x2}) + t_1(I_{x2} - I_{x1}), t_3(w_iH_i - I_{x3}) + t_1(I_{x2} - I_{x1}) + t_2(I_{x3} - I_{x2})\}\},$$

where t_1, t_2, and t_3 are the three welfare tax rates, $t_1 < t_2 < t_3$; and I_{x1}, I_{x2}, and I_{x3} are the corresponding earnings exemption levels, $I_{x1} < I_{x2} < I_{x3}$. Earnings below I_{x1} are exempted from the welfare tax. Earnings between I_{x1} and I_{x2} are taxed at rate t_1. Earnings between I_{x2} and I_{x3} are taxed at rate t_2. And, earnings above I_{x3} are taxed at rate t_3.

The benefit formula in equation (3.3) will be used to derive the general model and its predictions. Nevertheless, in the subsequent empirical analysis, each household's welfare benefit is calculated in accordance with the provincial regulations where the household resides (Table B5 in Appendix B).

iii) The Welfare Participation Decision

An eligible household maximizes utility, given by equation (3.1), subject to the budget constraint (3.2) and the benefit equation (3.3). Since P_i is dichotomous, the utility maximum can be determined by examining two cases. First, when $P_i = 0$, the non-pecuniary cost of being on welfare (ϕ_i) and the welfare benefit (B_i) in the utility function and the budget constraint are equal to zero. Second, when $P_i = 1$, utility is $U(\ell_i, C_i) - \phi_i$ and the budget constraint is $N_2L_2M_2Y_1$ in Figure 3.1.

The maximum utility attained when $P_i = 0$ (not on welfare) is given by:

$$(3.6)\quad V_{0i} = V(w_i, N_i).$$

The maximum utility attained without welfare varies with the wage rate and non-labour income. From the properties of the indirect utility function, V_{0i} is non-decreasing in the wage rate and non-labour income.

For welfare recipients ($P_i = 1$), maximum utility has the form:

$$(3.7)\quad V_{1i} = V(w_i, B_i') - \phi_i \qquad \text{if } w_iH_i \leq I_x, \text{ and}$$

$$= V(w_i(1-t), B_i' + tI_x) - \phi_i \qquad \text{if } w_iH_i > I_x.$$

When earnings (w_iH_i) are below the earnings exemption I_x (earnings are on the budget segment N_2L_2 in Figure 3.1), the welfare tax rate (t) is zero and the maximum utility varies with the wage rate (w_i) and the welfare benefit (B_i'). When earnings are above the earnings exemption I_x (earnings are on the budget segment L_2M_2 in Figure 3.1), the maximum utility attained varies with the effective wage rate, $w_i(1-t)$, and the net welfare benefit ($B_i' + tI_x$). In addition, the non-pecuniary cost of being on welfare, or welfare stigma, reduces the utility from being on welfare by ϕ_i.

The net welfare benefit when earnings are above the earnings exemption is $B_i' + tI_x$ which is referred to as the individual's virtual income (Hausman, 1980). The notion behind the use of virtual income is that an individual on the budget segment L_2M_2 (Figure 3.1) behaves as if $B_i' + tI_x$ is his/her non-labour income and his/her budget constraint is linear with slope $w_i(1-t)$. The linearization of the budget constraint in this way facilitates a solution to the utility maximization problem when the budget constraint is nonconvex as in this study.

In the absence of administrative discretion, eligible individual *i* chooses to be on welfare ($P_i = 1$) if there is a net utility gain from being on welfare (that is, if $V_{1i} - V_{0i} > 0$). Let the maximum utility without welfare be at E_1 in Figure 3.3. With welfare, individual *i* faces a lower effective wage rate ($w_i(1-t)$) but higher non-labour income ($B_i' + tI_x$). Suppose that a lower wage rate as well as higher non-labour income reduce hours of work. Individual *i* would choose to apply for welfare if there is no distaste for welfare, or any other constraints on the individual's behaviour. The new utility maximum with welfare is at E_2.

However, there may be a non-pecuniary cost, ϕ_i, associated with being on welfare. This non-pecuniary cost involves information costs, time costs of applying for and obtaining welfare, and any stigma that is associated with being a welfare recipient. These costs, particularly stigma, are expected to vary from person to person. Specifically, stigma is likely to be correlated with the person's education level, age, gender, family status,[5] number of children and area of residence, and the unemployment rate. For example, a well-educated person or an older person who is more concerned with social status may have higher welfare stigma. On the other hand, a person who lives in a province in which welfare is widespread may be more likely to have lower welfare stigma.[6]

The non-pecuniary costs of welfare participation reduce the utility gain from being on welfare by ϕ_i. If individual *i*'s non-pecuniary cost of welfare participation is greater than the utility gain exclusive of stigma, $V(w_i(1-t), B_i' + tI_x) - V(w_i, N_i)$, he/she will not apply for welfare. On the contrary, he/she will apply if this cost is less than $V(w_i(1-t), B_i' + tI_x) - V(w_i, N_i)$.

---

[5] While family status is expected to affect an individual's welfare participation decision, it is also possible that welfare may affect an individual's decisions regarding family status. However, as in other studies, this thesis assumes that family status is determined exogenously.

[6] The factors that affect the non-pecuniary cost of being on welfare could also possibly determine job opportunities and/or quantity constraints in the labour market as shown in Osberg and Phipps (1993). As a result, a change in these factors may imply a change in the constraint in the demand for labour and, in turn, may affect the welfare participation decision.

3.2.3 Predictions of the Model

When the key economic variables change, their net effects on V_{1i} and V_{0i} may cause individuals' behaviour to change, resulting in changes in welfare eligibility and participation. The following discussion examines how work-welfare decisions are affected by changes in the wage rate, the benefit rate, the tax (clawback) rate, the earned income exemption and the non-pecuniary cost of welfare participation. These predictions of the model are then tested in the empirical analysis.

i) Wage Rate Increase

When the wage rate increases (other things being constant), the slopes of the budget lines N_1Y_1, N_2L_2 and L_2M_2 (the dotted lines in Figure 3.4) become steeper (the bold lines). Given I_x and B_i', a higher wage rate lowers the hours of work at which $I_x = w_iH_i$, $B_i' = w_iH_i + N_i$, and $B_i' = N_i + tw_iH_i - tI_x$. Points ℓ_1, ℓ_2, and ℓ_3 in Figure 3.1 move to the right (to ℓ_1', ℓ_2', and ℓ_3', respectively, in Figure 3.4). The new opportunity set for a welfare recipient is given by $N_2L_2'M_2'Y_1'$.

An individual who works more than $(T - \ell_3')$ hours but less than $(T - \ell_3)$ hours is eligible for welfare before the wage rate increase, but is ineligible afterwards. Without a change in the hours worked by all individuals, the number of households who are eligible for welfare declines since the maximum hours of work required for eligibility has been lowered. Moreover, if the individual's hours of work increase with the wage rate, he/she will earn more when the wage rate increases. With higher earnings, some welfare recipients are likely to become ineligible.

Assume that the labour supply of a low-income individual has a positive slope—that is, a higher wage rate increases hours of work. From Figure 3.4, an individual whose hours of work are close to $T - \ell_3'$ may increase hours of work to above $T - \ell_3'$ when the wage rate increases. This individual will be cut off welfare since his/her earnings are higher than the eligible level.

In addition, an individual who is still eligible for welfare after the wage rate increase may not choose to receive welfare. As the wage rate increases, hours of work increase and move to the left on the horizontal axis (Figure 3.4) when the wage rate has a positive effect on labour supply. As a consequence, the net welfare benefit (the distance between $L_1'M_2'$ and $L_2'M_2'$) becomes smaller and, therefore, the utility gain from welfare exclusive of stigma, $V(w_i'(1 - t), B_i' + tI_x) - V(w_i', N_i)$, is smaller and some welfare recipients may choose to leave welfare.

This effect, as well as the other effects of a wage increase described above, implies that the number of welfare recipients should be lower when the wage rate increases.

ii) Benefit Rate Increase

When the benefit rate increases, the hours of work at which the welfare benefit equals an individual's income (the distance $T\ell_2$ in Figure 3.5) and the hours of work at which the net benefit equals the income clawback (the distance $T\ell_3$ in Figure 3.5) increase to the distances $T\ell_2'$ and $T\ell_3'$, respectively. In addition, the budget segment $N_2L_2M_2$ shifts upward to $N_2'L_2'M_2'$. The distance N_2N_2' is equal to the benefit increase. Point M_1 increases to M_1', and M_2 increases to M_2'.

More people are now eligible for welfare (if their initial hours of work remain constant). For example, an individual who works more than $T - l_3$ hours (to the left of point M_2) is ineligible before the benefit change. After the benefit increases by N_2N_2', this individual may become eligible and may choose welfare. In addition, given a constant non-pecuniary welfare cost, more eligible individuals will apply for welfare since the net utility gain from being on welfare is greater following the benefit increase.

iii) Welfare Tax Rate Increase

When the welfare tax rate increases, the slope of the budget segment L_2M_2, which is $-w_i(1 - t)$, becomes flatter and L_2M_2 rotates downward to L_2M_2' (Figure 3.6). The budget segment N_2L_2 is unaffected since the earnings below I_x are not clawed back. Due to the higher tax rate, the hours of work at which the clawback equals the net benefit decline ($T - l_3$ falls to $T - l_3'$). Individuals who work more than $T - l_3'$ hours, but less than $T - l_3$ hours are eligible for welfare before the tax rate change, but are no longer eligible after the tax rate increase. Therefore, fewer people tend to be eligible for welfare. Welfare recipients who have earnings on the budget segment $M_2''M_2$ before the tax rate change will be ineligible and leave welfare, assuming their initial hours of work remain constant.

A higher welfare tax rate (t') leads to a lower effective wage rate ($w_i(1 - t')$) and higher virtual income (the $t'I_x$ part of virtual income or non-labour income)[7] for welfare recipients who earn above I_x. A lower effective wage rate and a higher virtual income are

[7] The tI_x part of virtual income is a result of not paying taxes on the earnings exemption.

likely to reduce the hours of work for welfare recipients. The net utility gain, $V(w_i(1 - t'), B_i' + t'I_x) - V(w_i, N_i) - \phi_i$, is smaller than before the tax increase. Thus, it is more likely that fewer individuals will choose to be on welfare even if they remain eligible.

However, if individuals are on the budget segment N_1L_1 or N_2L_2, a higher welfare tax back rate does not affect their work-welfare decisions. Since the welfare tax does not affect their effective wage rate or their utility attained from leisure and consumption, it does not affect their welfare participation decisions.

iv) Earnings Exemption Reduction

When the earnings exemption is reduced from I_x to I_x', the new budget line for a welfare recipient is $N_2L_2'M_2'$ (Figure 3.7). The budget segment L_2M_2 shifts downward to $L_2'M_2'$. Given the initial hours of work, fewer people tend to be eligible for welfare as the hours of work at which $B_i' = N_i + tw_iH_i - tI_x$ moves to the right (from l_3 to l_3'). Other things being constant, the utility gain from welfare $V(w_i(1 - t), B_i' + tI_x') - V(w_i, N_i) - \phi_i$ also falls when the earned income exemption decreases. As a result, a lower earnings exemption should reduce the number of eligible individuals choosing welfare.

v) Change in the Non-pecuniary Cost of Welfare Participation

Any changes in factors that affect the non-pecuniary cost of welfare participation (ϕ_i) such as education, age, gender, family status, number of children by age group, the unemployment rate, and province of residence may affect the utility attained from welfare: $V(w_i(1 - t), B_i' + tI_x) - \phi_i$. Consequently, a change of this type may alter $V_{1i} - V_{0i}$ and, thus, an individual's work-welfare decisions.

Individuals who are young or have low levels of education are likely to have less work experience and job opportunities. These individuals may not have as large a negative perception of welfare. An increase in the number of young children or dependents may reduce the non-pecuniary cost of welfare participation for single parents. Low-income households with many children or dependents may be needy and have fewer alternative sources of income. Hence, they may have to lower their non-pecuniary welfare cost or stigma and, thus, they may be more likely to be on welfare. A higher unemployment rate is also expected to reduce stigma. Since a high unemployment rate makes it more difficult to find a job, it may make welfare participation more common. Moreover, individuals living in different provinces may have different feelings about being on welfare. Individuals who live in provinces that have a high proportion of people on social assistance programs may have lower stigma than individuals in other provinces.

To summarize the analysis above, we predict that a higher wage rate or welfare tax rate should reduce an individual's likelihood of welfare participation and, thus, the number of welfare recipients. In contrast, a higher benefit rate or earned income exemption should increase an individual's likelihood of welfare participation. Individuals who are old or well educated may be less likely to be on welfare if these factors are positively correlated with welfare stigma. Individuals who have more or young children, or who live in a province in which welfare is widespread or the unemployment rate is high, may be more likely to be on welfare since these factors seem to reduce welfare stigma.

3.2.4 A Model of Administrative Selection

The analysis of welfare participation presented in the previous section is based on the assumption that there is no limitation on the availability of welfare for an eligible applicant. That is, he/she can choose to participate in the welfare program if his/her net utility gain from welfare is positive and he/she is eligible. However, under the welfare system in Canada, an eligible person (according to the needs test) may not be selected for welfare if program administrators do not believe that he/she is really in need or more needy than other eligible persons. For example, a low-income household whose head is a single parent with young children may be considered to be more needy than a single employable person who is currently unemployed even if they both meet the needs test. Indeed, a needy single employable person who is currently unemployed and who wants short-term income assistance may have to convince welfare administrators that he/she has been seeking work before applying for welfare.

In Figure 3.8, if individual *i* is on welfare, he/she will work $T - \ell_6$ hours. The utility maximum is at E_2. However, when we observe that eligible individual *j* works $T - \ell_5$ hours and does not receive social assistance, the following implication can be addressed: individual *j* either has high stigma (that is, $\phi_j > V(w_j(1 - t), B_j' + tI_x) - V(w_j, N_j)$) or he/she has not been selected for welfare. In other words, observing that an individual is not on welfare when they are eligible does not mean that they have chosen not to be on welfare.

Assume that welfare administrators observe that a person (*i*) with given expected earnings and personal characteristics works $T - \ell_4$ hours. If a similar individual (*j*) who works $T - \ell_5$ hours convinces welfare administrators that he/she is seeking more work but cannot find it,[8] the welfare administrators may grant welfare to this individual since the expected hours of work $(T - \ell_4)$ are unattainable to this person due to the demand constraint in the labour market. However, if individual *j* who works $T - \ell_5$ hours is not seeking more work,[9] his/her low income is actually a result of a distaste for work. In this case, welfare administrators may deny individual *j* income assistance. The constraint on the supply of welfare (limit on the availability of welfare) does not allow this person to maximize his/her utility at E_2.

It is possible that welfare administrators could turn down some eligible applicants without considering whether they have been seeking work. Suppose that welfare administrators consider an applicant's potential income to be a key variable for determining administrative selection. Given the applicant's personal and household characteristics, and based on the observed income of welfare non-recipients with similar characteristics, the welfare administrator estimates the applicant's potential income. If the applicant's potential income equals or exceeds the minimum standard of living defined by the provincial regulation, he/she may be turned down for welfare (even if their current income meets the eligibility criteria). In Figure 3.8, an applicant with potential income above Y_2 may be turned down even though their current income may be below this level.

---

[8] In the Canadian welfare system, some provinces require an employable client, as a condition of continuing eligibility, to agree to submit written confirmation of active job search upon request by the administrating authority (an honour system with the possibility of a demand for proof). Other provinces require employable clients either to re-apply for assistance each month or to submit a specific list of potential employers contacted or interviews attended.

[9] Because the utility maximum $V(w_i, N_i)$ is at $T - \ell_5$ hours of work.

Besides the individual's potential income and personal and household characteristics, the government budget constraint, the business cycle, and public pressure are also important factors that may make welfare administrators limit the availability of welfare. With a limited budget for social services, administrators may try to select only the most needy applicants irrespective of the eligibility regulations. This makes the utility level $V_i(w_i, B'_i) - \phi_i$ or $V_i(w_i(1-t), B'_i + tI_x) - \phi_i$ unattainable for many eligible applicants.

As a consequence of the factors noted above, the actual receipt of welfare benefits is the result of a series of sequential decisions. Specifically, eligible individuals must decide whether to apply for welfare and then welfare administrators select those eligible applicants who, they believe, should receive welfare.

i) Modeling Administrative Selection

The rules used by welfare administrators to determine who will receive welfare are not based on an individual's utility since the individual's taste or distaste for welfare and work are not observable. To formalize the administrative selection process, let welfare administrators develop two indices; one represents the administrator's evaluation of an individual's potential well-being in the absence of welfare (S_i^*) and another represents the administrator's determination of the minimum acceptable level of well-being for an individual (S_i^{**}). An eligible applicant is selected for welfare if his/her index of potential well-being (S_i^*) is below the administrator's index of the acceptable level of well-being (S_i^{**}), that is, if $S_i^* < S_i^{**}$. In reality, we do not observe these two indices separately. However, we do observe when $S_i^* < S_i^{**}$ for those who choose welfare since in this case the applicant is selected for welfare.

ii) An Individual's Potential Well-Being (S_i^*)

It is assumed that welfare administrators determine an individual's potential well-being based on their potential income (y^e_i), and their family status (F_i). An increase in an individual's potential income increases the index of potential well-being. For a given potential earnings level, the index of potential well-being of a single individual is higher than that of a single parent because single parents must use potential income to meet the needs of more people. In addition, single parents have more responsibility and a tighter time constraint for their own leisure (a non-pecuniary well-being effect). For these reasons, the index of potential well-being of a single parent is likely to fall as the number of children increases, particularly if the children are below age two.

Let $S_i^* = S^*(y^e_i(X_{yi}, y_i^P, F_i, Z_{1i}), F_i)$, where S_i^* is the administrator's valuation of an individual's potential well-being, and y^e_i is the individual's potential income which is determined by personal characteristics (X_{yi}) (such as age, education and gender), average income in the past six months (y_i^P,), family status variables (F_i) (such as household type, having children below age two and the number of children), and a vector of variables including province of residence, provincial per-capita income and the unemployment rate (Z_{1i}).

The S_i^* function is drawn with a positive slope (Figure 3.9). The slope of S_{ji}^*, where j denotes a family type, depends on how important y_i^e is to the administrator in determining S_i^*. As the weight given to y_i^e in determining S_{ji}^* increases, the slope of the S_{ji}^* curve becomes steeper. In such a case, a small increase in y_i^e would lead to a larger increase in the S_i^* index.

In Figure 3.9, welfare administrators determine that the S_i^* function for a single individual (family status F_1) has the form given by $S_{1i}^*(F_1)$. Welfare administrators value the individual's index of potential well-being at S_1^* if the individual's potential income is y_1^e. A single individual who has lower education should have lower potential income at y_2^e, and a lower index of potential well-being at S_2^*.

As noted above, the valuation of S_i^* differs with family status. Figure 3.9 shows that a single person (with a family status F_1) who has potential income of y_2^e may have potential well-being of S_2^* (on the line S_{1i}^*). A single parent family (with family status F_2) will have the same potential well-being of S_2^* (on the line S_{2i}^*) if it has the higher potential income of y_1^e to compensate for the pecuniary and non-pecuniary hardship of being the head of a single parent family. At the same level of potential income, a single parent has a lower S_i^* than a single person. A lower valuation of S_i^* increases the likelihood that the condition $S_i^* < S_i^{**}$ will be met for an individual and, hence, increases the likelihood that he/she is selected for welfare.

iii) The Minimum Acceptable Level of Well-Being (S_i^{**})

The administrator's determination of the minimum acceptable level of well-being for an individual (S_i^{**}) depends on variables that may affect the cost of providing welfare in each province. Let $S_i^{**} = S^{**}(Z_{2i})$, where Z_{2i} is a vector of variables that affect the provincial cost of providing welfare. Note, however, that the administrator's acceptable index of well-being (S_i^{**}) does not vary with the individual's potential income and family status (Figure 3.10) since both factors are already taken into account in the index of the individual's potential well-being.

Here, Z_{2i} includes such province-related variables as per-capita income, the ratio of the government deficit to GDP and the unemployment rate. For example, a higher government deficit to GDP ratio means a greater drain (*e.g.*, debt payment) on government revenues and implies that the cost of welfare relative to government revenue will be higher. In this case, taxpayers may want welfare administrators to reduce expenditure on social services. This may cause the S_i^{**} index to fall. On the other hand, in a province with a high level of per-capita income, people might be willing to provide greater support for low-income people since this might reduce social problems in their province, or they might provide greater welfare support because charity is a normal good. In these types of provinces, S_i^{**} may be higher.

In the formulation of the administrator's determination of the minimum acceptable level of well-being (S_i^{**}), the standard welfare payment and the benefit rate have no direct role. Benefit rates are set provincially, and the level at which they are set may depend on the factors that determine S_i^{**}. For example, an increase in per-capita income may, with some lag, result in an increase in the benefit rate. Similarly, increasing deficits may result in a cut in the benefit rate. However, it is changes in these types of factors, rather than a change in the benefit rate itself, that cause a change in S_i^{**}. As a result of a changing fiscal situation, S_i^{**} may be increased or reduced with no corresponding change in the benefit rate. It would typically be the case that, if any changes are made to the benefit rate, they would occur at the same time, or subsequent, to similar (in terms of direction) changes in S_i^{**}. While a change in the benefit rate affects the number of people eligible for welfare and, potentially, the number of welfare recipients, it does not directly affect the administrators' degree of discretion if the fiscal situation remains unchanged.

Figure 3.11 includes S_i^* and S_i^{**} together. Given the administrator's index of the minimum acceptable level of well-being for an individual, $S_{1i}^{**}(Z_{2i})$, a single individual with family status F_1, who has an index of potential well-being of $S_{1i}^*(F_1)$, will be selected for welfare if his/her potential income is below y_1^c. However, for a single parent with family status F_2, the index of potential well-being is given by $S_{2i}^*(F_2)$. Therefore, a single parent who has potential income below y_2^c (which is greater than y_1^c) will be selected for welfare.

We can extend the model with administrative selection by adding more explanatory variables to the vector Z_{2i} that determines the index of the minimum acceptable level of well-being S_i^{**}. Possible additional variables are the growth of the welfare caseload, the economic growth rate, the marginal income tax rate, and measures of poverty lines.[10] A province that has a high rate of growth in its welfare caseload or a high marginal tax rate may be reluctant to have a high S_i^{**} value. Higher growth in the welfare caseload means that expenditure on social services is growing quickly and this may strain resources. A higher marginal tax rate may imply that higher spending on welfare may cause larger distortions. On the other hand, the level of S_i^{**} may increase

[10]We cannot use these variables in the empirical analysis below. Since they are all annual province-specific variables, they do not vary enough to include in our two-year longitudinal data set.

with economic growth, or an increase in the poverty line or some other measure of the minimum resources necessary to meet household needs (which generally would include food, clothing, shelter, utilities and personal needs).

3.2.5 Predictions of the Model with Administrative Selection

Since an individual's index of potential well-being (S_i^*) varies with potential income and family status, any changes in this status or in the factors that cause potential income to change (such as personal and household characteristics, an individual's average past income, province of residence, provincial per-capita income, or the unemployment rate) affect this index and subsequently the individual's probability of being selected for welfare. Moreover, changes in provincial per-capita income and the unemployment rate also affect the index of the minimum acceptable level of well-being. The following are the predictions of administrative selection when the associated variables change.

i) Changes in the Factors that Effect S_i^*

The personal characteristics that affect potential income are age, education, and gender. Given the same education, older individuals may have more work experience and are expected to earn more than younger individuals. Individuals with more education may have a higher stock of human capital and are expected to be able to earn more than individuals with lower education. Males may be expected to earn more than females. To the extent that these characteristics increase an individual's potential income (y_i^e) and S_i^*, individuals who are male, older or have more education should be less likely to be selected for welfare.

Average income in the past six months may be a good indicator of an individual's potential income. Without any shocks to the economy, or any shocks that affect an individual's ability to work, an individual who had a high average income in the past six months will tend to have a high current income.

Besides personal characteristics and average past income, other provincially related factors, such as per-capita income and the unemployment rate (which may reflect provincial labour market conditions) may also change an individual's potential income. Higher per-capita income and a lower unemployment rate may imply that the state of the economy is good. This makes it more likely that individual *i* will have higher expected income and, therefore, higher potential well-being (S_i^*).

Finally, family status variables also have a role in determining S_i^* through potential income. While potential income depends on personal characteristics, average past income, and the state of the economy, the possibility of realizing these potential incomes is likely to be reduced significantly for single parents, especially those with young children. For example, such parents might only be available to work for fewer hours, or they may need to take jobs that provide them with an increased degree of flexibility in working hours.

A change in family status may also affect S_i^* directly. Changing status from a single person to a single parent reduces an individual's non-pecuniary potential well-being (even if their potential income does not change). Moreover, a single parent who has more children also tends to have lower potential well-being than those who have fewer children. Individuals in this category, even though they may have the same potential income as individuals with no children, are likely to have a lower S_i^* index and, thus, may be more likely to be selected for welfare.

ii) Changes in the Factors that Effect S_i^{**}

In addition to the factors that affect S_i^*, the factors that affect the administrator's minimum acceptable level of well-being (S_i^{**}), such as provincially related variables, will also affect the selection criteria. The provincially related variables included in Z_{2i} are the ratio of the government deficit to GDP, per-capita income, and the unemployment rate.

A higher deficit to GDP ratio may imply that social assistance is more costly. The government may wish to control this cost by reducing S_i^{**}. For example, let the deficit to GDP ratio increases from Z_{2i} to Z_{2i}'. The higher relative cost of providing welfare associated with the deficit increase may put pressure on welfare administrators to cut spending and adjust the minimum acceptable level of well-being downward. In Figure 3.12, the index S_{1i}^{**} (Z_{2i}) shifts downward to S_{2i}^{**} (Z_{2i}'). The level of potential income at which S_i^* equals S_i^{**} decreases from y_1^e to y_2^e. As a result, eligible applicants with potential income between y_2^e and y_1^e will no longer be selected.

A welfare administrator's minimum acceptable level of well-being is likely to be positively related to provincial per-capita income and job opportunities. Higher per-capita income and improving job opportunities (*i.e.*, a lower unemployment rate) increase the economic well-being of working people. As a result, they may be willing to support greater government spending on social services. This may raise S_i^{**} and an individual's likelihood of being selected for welfare. For example, in Figure 3.12, suppose that welfare administrators raise S_i^{**} from S_{1i}^{**} to S_{3i}^{**}. This allows individuals with higher potential incomes (from y_1^e to y_3^e) to be selected for welfare.

From the above analysis, we predict that a higher ratio of the deficit to GDP should reduce S_i^{**} and, thus, it reduces an individual's likelihood of being selected for welfare. Higher per-capita income or a lower unemployment rate should increase S_i^{*} and S_i^{**}. As S_i^{*} increases, this will reduce the likelihood that an individual will be selected for welfare, but, as S_i^{**} increases, the likelihood that an individual will be selected for welfare should also increase. The net effect of these variables is, therefore, ambiguous. Moreover, individual characteristics and family status also affect an individual's likelihood to being selected for welfare through S_i^{*}. A working-age and well-educated individual may be less likely to be selected for welfare since they may have higher potential earnings. Lastly, a single parent with dependents may be more likely to be selected for welfare.

In this section we have discussed the theoretical framework for the individual's welfare decision and developed a model of welfare participation that allows for administrative selection from among eligible welfare applicants. Administrative selection is expected to have an important role in the Canadian welfare system where provincial governments control their own welfare regulations and administration. The next section will describe the empirical implementation of the model.

3.3 Empirical Implementation

In the previous section we described a theoretical model of welfare participation with and without administrative selection. In this section we specify how the model of the previous section can be empirically implemented.

3.3.1 Functional Form and Econometric Specification

i) Welfare Decision

As explained in the previous section, the maximum utility attained when on welfare (V_{1i}) is a function of the wage rate (w_i or $w_i(1-t)$), the net welfare benefit (B_i' or $B_i' + tI_x$), which equals an individual's virtual income, and the non-pecuniary cost of receiving welfare (ϕ_i). The maximum utility attained when not receiving welfare (V_{0i}) is a function of the wage rate (w_i) and non-labour income (N_i). Without a supply side constraint (no discretionary role for administrators), an eligible individual can be on welfare if he/she so chooses. Let SA_i^* be the net utility gain from receiving welfare:

$$(3.8) \quad SA_i^* = V_{1i} - V_{0i}$$

$$= V(w_i, B_i') - \phi_i - V(w_i, N_i) \qquad \text{if } w_iH_i \le I_x \text{, and}$$

$$= V(w_i(1-t), B_i' + tI_x) - \phi_i - V(w_i, N_i) \qquad \text{if } w_iH_i > I_x.$$

Assuming that SA_i^* is a linear function of the wage rate, the welfare tax rate, the net benefit, and non-labour income; and that the non-pecuniary cost of receiving welfare reduces the net utility gain from welfare one for one,[11] equation (3.8) can be rewritten as:

$$(3.9) \quad SA_i^* = \alpha_0 + \alpha_1 w_i + \alpha_2 t + \alpha_3 (B_i' + tI_x) + \alpha_4 N_i - \phi_i .$$

From the analysis in the previous section, it is predicted that $\alpha_1 < 0$, $\alpha_2 < 0$, $\alpha_3 > 0$, and $\alpha_4 < 0$. An increase in the wage rate, the welfare tax rate or non-labour income is expected to reduce the individual's utility gain from receiving welfare. A higher net

[11] It is assumed that each individual faces the linear budget constraint that corresponds to his/her hours of work. As mentioned earlier, a linearization of the budget constraint facilitates the solution to the utility maximization problem.

welfare benefit increases the attractiveness of welfare and may increase the individual's utility gain from receiving welfare.

Let ϕ_i be a linear function of observed individual and household characteristics, province of residence and the unemployment rate (all of which are elements in the vector X_{1i}), and unobserved factors that can be represented by a random error term (ε_{1i}). Thus,

(3.10) $\phi_i = X_{1i}\gamma_1 + \varepsilon_{1i}$.

Substituting (3.10) into (3.9) yields:

(3.11) $SA_i^* = \alpha_0 + \alpha_1 w_i + \alpha_2 t + \alpha_3(B_i' + tI_x) + \alpha_4 N_i - X_{1i}\gamma_1 - \varepsilon_{1i}$.

Although the variable SA_i^* is unobserved, it is possible to observe whether an individual is on welfare. Let $SA_i = 1$ if individual *i* is on welfare. Without supply side effects, we observe an individual on welfare ($SA_i = 1$) if $SA_i^* > 0$, and off welfare ($SA_i = 0$) if $SA_i^* \leq 0$. Hence, the probability that an eligible person will be on welfare is:

$$
\begin{aligned}
(3.12)\quad \Pr(SA_i = 1) &= \Pr(SA_i^* > 0) \\
&= \Pr(\alpha_0 + \alpha_1 w_i + \alpha_2 t + \alpha_3(B_i' + tI_x) + \alpha_4 N_i - X_{1i}\gamma_1 - \varepsilon_{1i} > 0) \\
&= \Pr(\varepsilon_{1i} < \alpha_0 + \alpha_1 w_i + \alpha_2 t + \alpha_3(B_i' + tI_x) + \alpha_4 N_i - X_{1i}\gamma_1) \\
&= \Phi_1(X_{SAi}\beta_{SA}),
\end{aligned}
$$

where Φ_1 is a cumulative density function; X_{SAi} is a vector which includes a constant term, w_i, t, $(B_i' + tI_x)$, N_i, and the variables in vector X_{1i}; and β_{SA} is a vector of the parameters that are associated with the variables in the vector X_{SAi}.

ii) Administrative Selection

With administrative selection, some applicants are not selected for welfare even if they are eligible by the needs test. In other words, the supply of welfare is constrained. Define $S_i = 1$ if an eligible applicant is selected for welfare. Welfare administrators make a welfare granting decision based on their valuation of the individual's potential well-being (S_i^*) and the minimum acceptable level of well-being (S_i^{**}).

Here, S_i^* is assumed to be a linear function of potential income (y^e_i) and family status (F_i):

(3.13) $S_i^* = \delta_1 + y_i^e\delta_2 + F_i\delta_3 + \varepsilon_{s1i}$.

A higher level of potential income increases S_i^* and, thus, δ_2 is expected to be nonnegative.

While the level of potential income is a pecuniary variable, family status, as a result of non-pecuniary factors, may also influence an individual's potential well-being. The family status vector, F_i, includes variables representing household type (*i.e.*, a single-parent or single-person household) and NC_i. The vector NC_i includes a one-zero variable for parents with children below age two and an additional variable that indicates the total number of children. At a given level of y_i^e, a single-parent household is expected to have lower potential well-being than a single-person household. Furthermore, a single parent with more children (or young children) is expected to have lower S_i^* than those with fewer (or older) children. Since the subsequent empirical analysis is conducted on sample sets that contain only one type of household,[12] no household type variable is included in F_i. For single-parent households, F_i includes only the two child-status variables so that δ_3, the vector of coefficients on these variables, is expected to be negative.

Welfare administrators are assumed to determine an applicant's potential income based on the applicant's past income, personal characteristics such as age, education and gender (the elements of the vector X_{yi}), the individual's average past income (y_i^P), family status (F_i), as well as the province of residence, provincial per-capita income, and the unemployment rate (the elements of the vector Z_{1i}). Thus, an income function is specified as:

$$(3.14)\quad y_i = X_{yi}\gamma_y + y_i^P\gamma_{yp} + F_i\gamma_f + Z_{1i}\gamma_{z1} + \varepsilon_{yi},$$

where ε_{yi} is an error term with mean zero. Expected income, hereafter, referred to as potential income, is given by:

$$(3.15)\quad E(y_i) = X_{yi}\gamma_y + y_i^P\gamma_{yp} + F_i\gamma_f + Z_{1i}\gamma_{z1} = y_i^e.$$

Substituting (3.15) into (3.13) and replacing F_i with NC_i yields:

$$\begin{aligned}(3.16)\quad S_i^* &= \delta_1 + X_{yi}\delta_2\gamma_y + y_i^P\delta_2\gamma_{yp} + Z_{1i}\delta_2\gamma_{z1} + NC_i(\delta_2\gamma_f + \delta_3) + \varepsilon_{s1i} \\ &= X_{2i}\gamma_2 + \varepsilon_{s1i},\end{aligned}$$

where X_{2i} is a vector that includes a constant term, y_i^P, and all the variables in vectors X_{yi}, Z_{1i} and NC_i; and γ_2 is a vector of the parameters that correspond to the variables in X_{2i}.

---

[12] Sample sets are separated by household type (single persons or single parents) because different household types are expected to have different behaviour and they may be treated differently by welfare administrators.

Now, let the administrator's index of the minimum acceptable level of well-being (S_i^{**}) be a linear function of the vector Z_{2i} which includes a constant term, the ratio of the government deficit to GDP, per-capita income and the unemployment rate:

(3.17) $S_i^{**} = Z_{2i}\gamma_{z2} + \varepsilon_{s2i}$,

where ε_{s2i} is a random variable.

Welfare administrators will select individual *i* to receive welfare if $S_i^{*} < S_i^{**}$. Therefore, the probability that eligible individual *i* will be selected for welfare is:

$$
\begin{aligned}
(3.18)\quad \Pr(S_i = 1) &= \Pr(S_i^{*} < S_i^{**}) \\
&= \Pr(X_{2i}\gamma_2 + \varepsilon_{s1i} < Z_{2i}\gamma_{z2} + \varepsilon_{s2i}) \\
&= \Pr(\varepsilon_{s1i} - \varepsilon_{s2i} < Z_{2i}\gamma_{z2} - X_{2i}\gamma_2) \\
&= \Pr(\varepsilon_{2i} < Z_{2i}\gamma_{z2} - X_{2i}\gamma_2) \\
&= \Phi_1(X_{Si}\beta_{Si}),
\end{aligned}
$$

where $\varepsilon_{2i} = \varepsilon_{s1i} - \varepsilon_{s2i}$; the vector X_{Si} includes all the variables in vectors Z_{2i} and X_{2i}; and the vector β_{Si} includes the parameters associated with variables in the vector X_{Si}. Thus, administrative selection depends on all factors that determine the individual's potential well-being as well as the minimum acceptable level of well-being.

iii) Welfare Decision with Administrative Selection

From the data we do not observe the outcome of the two decision processes (the decisions of the eligible individual and the welfare administrator) separately, but we do observe the outcome of both decisions. In other words, the data is partially observed (Poirier, 1980). To represent the available data, let $P_i = SA_i \times S_i$, where $P_i = 1$ if individual *i* is on welfare and zero otherwise. Specifically, we observe:

$P_i = 1$ when $SA_i^* > 0$ and $S_i^* < S_i^{**}$; and

$P_i = 0$ when 1. $SA_i^* > 0$ and $S_i^* > S_i^{**}$,

2. $SA_i^* < 0$ and $S_i^* > S_i^{**}$,

3. $SA_i^* < 0$ and $S_i^* < S_i^{**}$.

Eligible individuals who are observed to be on welfare satisfy the two conditions: $SA_i^* > 0$ and $S_i^* < S_i^{**}$. For non-recipients, either one or both of these conditions does not hold. Given this information, the probability that individual *i* is on welfare is the joint probability that he/she chooses welfare and is selected for welfare:

(3.19) $\Pr(P_i = 1) = \Pr(SA_i^* > 0, S_i^* < S_i^{**}) = \Pr(SA_i = 1, S_i = 1)$.

The probability that an individual is not on welfare is:

(3.20) $\Pr(P_i = 0) = 1 - \Pr(P_i = 1)$.

3.3.2 Econometric Method

Poirier (1980) developed an estimation method for a model with an observed binary outcome that results from the unobserved binary choices of two decision-makers. Boyes, Hoffman, and Low (1989) used partially observed data and applied Poirier's technique to a nonrandom sample of credit card applicants. Their purpose was to study a bivariate qualitative dependent variable model of loan granting and default. Since default can only occur and be observed if credit card applicants receive a loan, the study involved partial observability.

Abowd and Farber (1982), Heywood and Mohanty (1995) and many recent studies on partial observability have focused on queuing for union jobs. Abowd and Farber (1982), for example, assumed that an observed worker's union status was determined by the worker's desire for a union job and an employer's selection criteria. An individual will be working in a union job if he/she wants a union job and is selected from the queue. If an individual is not working on a union job, we cannot know whether that is because he/she does not want a union job or because he/she has not been selected from the queue. Assuming that worker and employer decisions are independent, Abowd and Farber estimated joint equations that determined the characteristics that made a worker more likely to enter the queue and the characteristics that made a worker more likely to be chosen from the queue. Their study rejected a simple probit model (no-queue model) for union status using a Likelihood Ratio test.

For welfare participation, it is possible that an individual's decision to be on welfare is correlated with the likelihood that he/she will be selected. For example, individuals may not apply for welfare during periods in which welfare administrators are controlling the cost of public assistance by restricting the number of welfare recipients, simply because they expect that they will be turned down. In this case, the correlation between the individual's decision and the administrator's selection decision will be positive. However, the correlation between the individual's decision and the administrator's selection decision could be negative. For example, welfare administrators may be temporarily more selective when there are too many welfare applicants.

Using equations (3.12) and (3.18), equation (3.19) can be rewritten as:

$$(3.21)\quad \Pr(P_i = 1) = \Pr(SA_i^* > 0,\ S_i^* < S_i^{**})$$

$$= \Pr(\varepsilon_{1i} < \alpha_0 + \alpha_1 w_i + \alpha_2 t + \alpha_3(B_i' + tI_x) + \alpha_4 N_i - X_{1i}\gamma_1,$$

$$\varepsilon_{2i} < Z_{2i}\gamma_{z2} - X_{2i}\gamma_2)$$

$$= \Phi_2(X_{SAi}\beta_{SAi},\ X_{Si}\beta_{Si};\ \rho),$$

where ρ is the correlation between ε_{1i} and ε_{2i}. The error terms, ε_{1i} and ε_{2i}, are assumed to have a bivariate standard normal distribution so that $\Phi_2(\cdot)$ is a cumulative bivariate standard normal distribution.

A Full Information Maximum Likelihood procedure is used to estimate the parameters in equation (3.21). The log-likelihood function is:

$$(3.22)\quad \ln L = \sum_{P_i=1} \ln[\Phi_2(X_{SAi}\beta_{SA}, X_{Si}\beta_S; \rho)] + \sum_{P_i=0} \ln[1 - \Phi_2(X_{SAi}\beta_{SA}, X_{Si}\beta_S; \rho)].$$

To test the effect of the correlation between the individual's and the administrator's decisions (ρ), the parameters are also estimated under the assumption that ε_{1i} and ε_{2i} are independent. In this case, equation (3.19) can be rewritten as:

$$(3.23)\quad \Pr(P_i = 1) = \Pr(SA_i = 1) \times \Pr(S_i = 1 | SA_i = 1)$$
$$= \Pr(SA^*_i > 0) \times \Pr(S_i^* < S_i^{**})$$
$$= \Phi_1(X_{SAi}\beta_{SAi}) \times \Phi_1(X_{Si}\beta_{Si}),$$

and the log-likelihood function is:

$$(3.24)\quad \ln L = \sum_{P_i=1} \ln[\Phi_1(X_{SAi}\beta_{SA}) \times \Phi_1(X_{Si}\beta_S)] + \sum_{P_i=0} \ln[1 - [\Phi_1(X_{SAi}\beta_{SA}) \times \Phi_1(X_{Si}\beta_S)].$$

In addition, to test the role of administrative selection, equation (3.23) is also estimated under the assumption that there is no administrative selection—that is, that $\Phi_1(X_{Si}\beta_S)$ is equal to one. In this case the log-likelihood function is:

$$(3.25)\quad \ln L = \sum_{P_i=1} \ln \Phi_1(X_{SAi}\beta_{SA}) + \sum_{P_i=0} \ln[1 - \Phi_1(X_{SAi}\beta_{SA})].$$

In summary, equations (3.22), (3.24) and (3.25) will be estimated using a Full Information Maximum Likelihood estimation procedure. Equation (3.22) is the most unrestricted model since it includes both a role for administrative selection and correlation between individual and administrator decisions. Equation (3.24) imposes the restriction on equation (3.22) that individual and administrator decisions are independent. Finally, equation (3.25) imposes the restriction on equation (3.23) that there is no administrative selection in the welfare participation process. The restrictions of no correlation between the individual and the administrator decisions and no administrative selection are tested using a Likelihood Ratio (LR) test.

3.4 The Data

The data used in this paper are from the Labour Market Activity Surveys (LMAS)[13] for 1988 through 1990. About 4.0-4.3 percent of total individuals in the LMAS data are on welfare. About 30 percent of welfare recipients were single parent while 28 percent of welfare recipients were single persons. About one-fourth of welfare recipients live in Quebec.

The sample includes heads of households who are 19-65 years old, not disabled, and not full-year full-time students. Heads of households who are disabled are excluded since their decisions to be on welfare may differ from those of able bodied individuals. Full-time students and the retired who receive pension income are not eligible for

[13] It should be noted that the welfare participation rate in LMAS is under-reported. While the proportion of welfare recipients to population in LMAS was about 4.0-4.3 percent in 1989-90, this proportion was 6.8-6.9 percent in the administrative data (see Figure 1.1). Quebec had the highest proportion of people on welfare in both the LMAS data (6.4-6.7 percent in 1989-90) and administrative data (8 percent in 1989-90).

welfare. In addition, the sample includes only single persons with or without children. Families are not included because LMAS does not provide family income which is required for calculating welfare eligibility.

The three-year panel data set from LMAS is used to create a pooled cross-section time-series data set. The manipulation of the LMAS data necessary to obtain this data set is described Appendix C. The constructed data set contains 17 monthly observations for each individual spanning the time period from February 1989 to June 1990.[14] This time period is chosen because the monthly social assistance status reported in LMAS starts in January 1989 and ends in December 1990.[15]

The sample is separated into two groups: single-person and single-parent households. These two groups may have different parameters determining their welfare participation. In particular, their distaste for welfare, as well as the selection criteria used by welfare administrators might be different for these two groups. Therefore, separating the two groups could improve the precision of the parameter estimates.

Since welfare eligibility is a requirement for the receipt of welfare benefits, the parameters of the model are estimated using data only on eligible individuals (where welfare eligibility is determined by an income test as discussed in Appendix B). In order to examine the importance of restricting the sample to eligible individuals, the model is

---

[14] Treating the 17 monthly observations for each individual as if they are observations from different persons could possibly lead to heteroskedasticity since the error terms may not be independent. However, this heteroskedasticity may also be present in the annual data and dealing with the non-independent of the errors is beyond the scope of this thesis.

[15] Initial estimates used a one-month lag of social assistance status (*i.e.*, we lose the observations in January 1989) and a six-month lead on each individual's earnings (*i.e.*, we lose the observations in July-December 1990). However, these two variables are not included in the empirical results because they are highly correlated with the current values of the variables.

also estimated employing data on all individuals (both eligible and ineligible) and the parameter estimates are compared to those that result when only data on eligible individuals are used.

3.4.1 Explanatory Variables

The explanatory variables that appear in the welfare participation equation that allows for correlation between individual and welfare administrator decisions (3.22), the welfare participation equation without such correlation (3.24), and the welfare participation equation that excludes the role of the welfare administrator (3.25) are w_i, t, $B_i' + tI_x$, N_i, and the variables in vectors X_{1i} (which includes individual and household characteristics, province of residence and the unemployment rate), X_{2i} (which includes individual and household characteristics, an individual's past income, province of residence, provincial per-capita income and the provincial unemployment rate), and Z_{2i} (which includes the provincial ratio of the government deficit to GDP, provincial per-capita income and the provincial unemployment rate). A list of these variables is provided in Table 3.12. The means of the explanatory variables and their expected signs are shown in Table 3.13 for the single-person sample and in Table 3.14 for the single-parent sample.

The variable w_i is the actual hourly wage rate for workers. However, the reported wage rates for non-workers are zero. Eliminating the observations with no wage rate data would result in sample selection bias. Consistent estimates of the wage rate for non-workers are obtained using a Heckman two-step method (Heckman, 1979). The estimation method and the results for the estimated wage rate equation are shown in

Appendix E.

The welfare tax rate (t), the welfare benefit (B_i'), and the earnings exemption (I_x) are calculated in accordance with household type, earnings and province of residence (Appendix B).

Data on non-labour income (N_i) are not available in the data set used. The effect of non-labour income is implicitly included in the constant and the error terms.

The vector X_{1i}, which contains variables that determine the non-pecuniary cost of being on welfare, includes the number of children by age group, the unemployment rate, and dummy variables representing age, education, gender and province of residence.

The X_{2i} vector contains variables that affect the administrator's index of an individual's potential well-being (S_i^*). These variables include the individual's past income, the individual's number of children, per-capita income, the unemployment rate, and dummy variables representing age, education, gender, whether the individual has children under two years of age and province of residence.

The variables included in the vector Z_{2i} (the determinants of S_i^{**}) are province-related variables such as the ratio of the government deficit to GDP, per-capita income, and the unemployment rate. Data on these variables are obtained from Statistics Canada's CANSIM database. The CANSIM labels for these variables are provided in Appendix D.

3.4.2 Data Description

i) LMAS

The data in LMAS consists of 55,434 persons and 97,081 job records during the period 1988-90 (Table 3.1). Approximately 79 percent of these job records are for paid workers and about 10 percent of job records are for unemployed persons (that is, they contain no data on jobs during the period 1988-90).

Only paid workers and unemployed persons (about 89 percent of job records) are selected for this study since they tend to be eligible for welfare and the data on their earnings are complete. There are 50,375 persons (about 91 percent of the sample) falling into these two categories. Table 3.2 provides a summary of the characteristics of these individuals. Only the data for 1989 and 1990 is reported in this Table because the empirical analysis does not use the observations for 1988.

ii) Sample Selection

Table 3.2 shows that in 1989 and 1990, respectively, about 15 and 16 percent of the sample were single persons, while about 6 percent of the sample in both years were single parents. More than 82 percent of the sample are not disabled and about 92 percent are 19-66 years old. About half of the sample are heads of households and approximately 87 percent of the sample have no pension income. Finally, more than 90 percent of the sample are not full-time full-year students.

Observations that fall in one of the shaded areas for *each* of the categories in Table 3.2 are selected for our sample set. This yields a sample of 2,600 single persons and 1,005 single parents. Each individual in this sample is associated with 17 monthly observations, each of which is treated as an independent observation (that is, as if they are all from separate individuals). Thus, the single-person sample contains 44,200 observations (*i.e.*, 2,600 × 17) and the single-parent sample contains 17,085 observations (*i.e.*, 1,005 × 17).

Single Persons

Table 3.3 provides descriptive characteristics of the single-person data set. Almost 80 percent of the observations are for individuals who are younger than 46. The Prairie provinces and Nova Scotia contain the highest proportion of the youngest age group while New Brunswick and Quebec contain a higher proportion of the oldest age group than the other provinces.

About 33 percent of the single individuals have high school education and about 47 percent have more than high school education. A greater proportion of individuals from Prince Edward Island are in the lowest level of education group. Newfoundland has the highest proportion of individuals with a diploma, whereas Ontario has the highest proportion of individuals with a university degree.

More than half of the sample is male. However, the distribution of males and females across provinces differs to some extent. For example, about 62 percent of the observations for British Columbia are male while only 52 percent of the observations for New Brunswick and Quebec are male.

The distribution of individuals across provinces who are members of a visible minority or who are on social assistance are obviously not even. About 97 percent of the sample are not members of a visible minority and about the same percentage does not receive social assistance.

The last part of Table 3.3 shows the average welfare benefit and average current, past and future incomes in 1986 dollars.[16] An individual's average past income is the

---

[16] See Appendix D for the calculation of 1986 dollars.

monthly average of the individual's income in the six months prior to the current month and average future income is the average of the individual's monthly income in the six months following the current month. The average current, past, and future incomes for all observations in the single-person sample are $864, $737 and $877 per month, respectively. These average incomes are highest in Alberta and lowest in Prince Edward Island.

Table 3.4 shows similar data to those in Table 3.3, but includes only single persons who are on welfare. This data indicate that single persons who are on welfare tend to be male (about 60 percent), 37-56 years old (about 54 percent), and have less than high school education (about 61 percent). The average welfare benefit and average current, past, and future incomes of single person welfare recipients are $389, $78, $99 and $104 per month, respectively.

Single Parents

Tables 3.5 and 3.6 show the distribution of single parents by age, education, gender, visible minority status, and average number of children. About 76 percent of single parents are in the 27-46 age group. There are more young single parents in Newfoundland, Nova Scotia, New Brunswick and Saskatchewan.

Overall, approximately 67 percent of single parents have high school education or less, but 57 percent of single parents in Newfoundland have less than high school education. Alberta has the highest proportion of single parents (44 percent) with a diploma or a university degree.

About 86 percent of all single parents are female and 95 percent are not members of a visible minority. The average number of children in the 0-2 age group is quite low, while most children are in the 6-15 age group. Approximately 23 percent of all single parents are on welfare. The average current, past, and future incomes of all single parents are \$610, \$518 and \$622 per month, respectively.

Single parents who are on welfare tend to be female, younger than 46 and have less than high school education (Table 3.6). They also have a higher average number of children age 0-2 and age 3-5 than does the entire group of single parents. The average monthly welfare benefit for single parent welfare recipients is \$992. The average current, past, and future incomes of single parents who are on welfare are very low, especially for those who live in Quebec.

iii) Eligible Samples

Tables 3.7 and 3.8 show the number of individuals eligible for welfare as well as the number of welfare recipients in the data set. Welfare eligibility is calculated using the income test only (as discussed in Appendix B) rather than the asset and income tests since LMAS does not report household assets.[17] There are only a small number of individuals who are ineligible according to the income test, but who are actually on welfare.[18] This indicates that our calculation of eligibility based on the income test is generally consistent with the observed data.

---

[17] The Survey of Consumer Finances 1984 is the latest survey that includes data on household wealth and non-labour incomes. From this survey, about 75 percent of single individuals who have income below the low income cut-off (1978 base) have no assets (excluding the value of liquid assets, a house, and a car). The mean values of liquid assets are \$2,492 for single persons without children and \$247 for single persons with children. Therefore, the asset test may be redundant in calculating welfare eligibility, particularly for single parents.

[18] There are 65 and 14 single persons and single parents, respectively, who are ineligible according to the income test but who are on welfare. These observations are deleted from the eligible sample set used in the empirical analysis.

Tables 3.7 and 3.8 show that the welfare take-up rate, the proportion of welfare recipients to eligible individuals, is very low. About 29 percent of single persons (12,993 of 44,200) are eligible for welfare, but only 9 percent of these (1,164 of 12,993) actually receive welfare. The ratio of eligible single persons to all single persons is highest in Prince Edward Island (about 69 percent) and lowest in Saskatchewan (about 14 percent). The welfare take-up rate is, however, highest in Quebec (about 27 percent) and lowest in Nova Scotia, Ontario and Alberta (about 3 percent).

Of all single parents, about 80 percent (13,652 of 17,085) are eligible for welfare and approximately 29 percent (3,981 of 13,652) of eligible single parents receive welfare. About 95-96 percent of single parents in Prince Edward Island, Ontario and British Columbia are eligible for welfare, but less than 30 percent receive welfare. The welfare take-up rate for single parents is highest in Quebec and Manitoba (about 37 percent) and lowest in Saskatchewan (about 21 percent).

The low welfare take-up rate in some provinces may occur because low income individuals have their own savings or obtain financial support from their parents, relatives or friends. However, these alternative sources of income are not indicated in the survey data. It may also be the case that many low-income individuals have a high non-pecuniary cost of welfare participation. Alternatively, they may want to receive welfare, but are not selected by administrators.

Income Ranges

Table 3.9 classifies eligible individuals by income ranges. The first row of this table gives the number of eligible individuals who do not work. The second row indicates the number of eligible individuals who work, but who have earnings below the earnings exemption. The third row gives the number of eligible individuals who earn more than the earnings exemption. Approximately 48 percent of eligible single persons (6,178 of 12,993) do not work and, therefore, have no earnings. About 18 percent of these non-workers (1,088 of 6,178) receive welfare. About 35 percent of eligible single parents (4,763 of 13,652) do not work and approximately 60 percent of these (2,857 of 4,763) are on welfare.

Table 3.10 classifies welfare recipients by income ranges and province.[19] None of the single person welfare recipients who live in Newfoundland or Prince Edward Island work. For all provinces, a small number of welfare recipients (5 single persons and 64 single parents) who earn below the earnings exemption[20] choose to work. In other words, most welfare recipients whose earnings are below the earnings exemption do not work. This may suggest that work incentives, such as a zero welfare tax rate and the earnings exemption, are not strong enough to encourage these welfare recipients to work. This might imply that these welfare recipients have a utility function that requires a very high wage rate to substitute sufficient consumption for leisure (*e.g.*, their indifference curve is very steep).[21]

---

[19] The number of welfare recipients in Quebec is over-represented in the LMAS sample of single persons. This may be because Quebec relaxed its welfare eligibility requirements for single persons.

[20] Who are on the budget segment N_2L_2 (Figure 3.12).

[21] A welfare recipient said "I think that at the present time, if I could find a job, I would refuse it since I would only be about $10 ahead a month by working as compared to welfare. It is not very encouraging. After paying transportation, food babysitting and the extras you need when working ... I would come out about $10 ahead ... So you stay where you are." (National Council of Welfare, 1987, p. 31).

It is not surprising that a higher proportion of eligible single parents (compared to eligible single persons) is on welfare, but it is quite surprising that a higher proportion of single parents in all provinces (except Ontario) works. It should be noted that while the welfare tax rate and the earnings exemption in Alberta are the same for all single persons and single parents, a higher proportion of welfare recipients who are single parents works.

Change in the Welfare Parameters

Table 3.11 shows how the number of eligible individuals changes if it is assumed that the welfare benefit, the welfare tax rate, and the earnings exemption each increase by 10 percent and there is no behavioural response to these changes. By altering the eligibility income test formula, changes in each of these parameters can have an impact on the number of eligible individuals. The results provided in Table 3.11 indicate which program parameters have the largest effect on welfare eligibility when individuals do not have time to adjust their behaviour.

When the monthly benefit rate increases by 10 percent, the percentage increase in eligible single persons is higher than the percentage increase in eligible single parents. A change in the welfare tax rate affects single parents more than single persons because a higher proportion of single parents works. A change in the earnings exemption has a smaller effect on the number of eligible individuals than the change in the welfare tax rate. This may be because earned income exemptions are set at very low levels, but welfare tax rates are set very high.

3.5 Empirical Results

The equations estimated are the welfare participation equation with correlation between individual and welfare administrator decisions (3.22), the welfare participation equation without this correlation (3.24), and the welfare participation equation without the role of the welfare administrator (3.25). An individual's welfare decision determines the probability of applying for welfare (as given by the SA equation) whereas the welfare administrator's selection decision determines the individual's probability of being selected for welfare (the S equation). The welfare outcome variable is P_i, which equals one if an individual is on welfare and equals zero otherwise.

The probability of applying for (or choosing) welfare (the SA equation) is a function of personal and household characteristics, the wage rate, the welfare tax rate, the welfare benefit, and the unemployment rate.[22] A higher wage rate or welfare tax rate is expected to reduce the probability of applying for welfare and the estimated coefficients should be negative. The estimated coefficients on the welfare benefit and the unemployment rate are expected to be positive (Tables 3.13 and 3.14).

The probability of being selected for welfare (the S equation) is a function of personal and household characteristics, average past income, provincial per-capita income, the ratio of the government deficit to GDP, and the unemployment rate. A higher individual past income is expected to reduce the probability of being selected for welfare

---

[22] As shown in the data description, the proportion of individuals on welfare is relatively small. The estimation of the welfare participation equation uses dummy variables representing age, education, and province of residence that are more aggregated than those used when estimating the probability of working and the wage rate equation (Appendix E) since there is not enough variation in the personal characteristics of welfare recipients to include all the disaggregated dummy variables.

and its estimated coefficient should be negative. The estimated coefficients of provincial per-capita income and the unemployment rate can be either positive or negative since they affect both individual potential well-being (S_i^*) and the administrator's minimum acceptable level of well-being (S_i^{**}). Finally, the estimated coefficient on the government deficit to GDP ratio is expected to be negative (Tables 3.13 and 3.14).

The results are divided into two sections. The first section shows the results for the single person sample. The second section shows the results for the single parent sample. In each section, the results that employ data on eligible individuals only are presented first. These are then compared to the results that would be obtained if data on all individuals had been used.

The parameters of the model are estimated using six specifications. Specification (1) allows for correlation between individual and welfare administrator decisions (equation (3.22)) while specification (2) is estimated when there is no such correlation (equation (3.24)). A model without administrative selection (specification (3)) is estimated by adding the restriction that all individuals who apply for welfare are selected for welfare (equation (3.25)). A Likelihood Ratio (LR) test is used to test this restriction. Three additional specifications are estimated to test the significance of particular variables in explaining welfare participation. Specification (4) deletes the provincial dummy variables from specification (1), while specifications (5) and (6) involve the estimation of specification (1) using re-categorizations of the dummy variables on education and age.[23]

3.5.1 Single Persons

i) Eligible Single Persons

The results for eligible single persons are shown in Tables 3.15 and 3.16. The first half of these tables represents the estimated parameters associated with the individual's welfare decision (the SA equation) and the second half pertains to the administrator's selection decision (the S equation). The reference case is a single female who is younger than 27, who has less than high school education, and who lives in the Atlantic region. The total number of observations in this sample is 12,993.

The results in specification (1), which allows for correlation between the individual and administrator decisions, show that the estimated coefficient on the wage rate has a negative sign (–5.7800) as predicted by the theory.[24] A higher wage rate tends to increase individuals' earnings and the welfare clawback, and, thus their probabilities of choosing welfare. The estimated coefficient on average past income also has a negative sign (see the second half of specification (1)). Single persons who have a higher average income in the past six months may have potential to earn more in the future and, thus, are less likely to be selected for welfare.

---

[23] Given the reason cited in the previous footnote, we must estimate specification (5) or (6) when we want to more finely distinguish the age or education variables. We are unable to re-categorize age and education in the same estimating equation.

[24] All empirical results use the wage rate without the inverse Mill's ratio included (W2) in the wage rate prediction equation. However, these estimates and the estimates that use the wage rate with the inverse Mill's ratio included (W1) yield quite similar results. Details of the wage rate estimation are given in Appendix E.

The effects of the welfare program variables are statistically significant. A higher welfare tax rate has a negative effect (–1.2138) on the probability of choosing welfare. Individuals who have labour income will have their benefits cut at rate t. With a higher t, their benefits are further reduced, and they may not choose welfare. The coefficient estimate on the welfare benefit is positive (0.5128). Higher benefits increase welfare incomes and the attractiveness of welfare and, thus, more people may choose welfare.

The parameter estimates on the province-related variables show that the unemployment rate does not have a positive effect on the probability of choosing welfare as predicted by the theory. This is consistent with the experience in some provinces such as Alberta. During the period 1988-90, the unemployment rate in Alberta was decreasing, but the welfare caseload did not decrease. The unemployment rate has a positive effect on administrative selection, however. A higher unemployment rate may reduce an individual's potential earnings and, thus, welfare administrators may ease their selection criteria.

Per-capita income and the ratio of the government deficit to GDP both have negative effects on administrative selection. High per-capita incomes may reflect a boom in the economy. Welfare administrators may want single persons to work rather than to receive welfare. As a result, they may be more selective. A higher ratio of the government deficit to GDP makes it more difficult for applicants to obtain welfare. This may be due to increased political and public pressure on the government to control spending.

Regarding the effects of personal characteristics, the results show that single persons who are older than 27 have a higher probability of choosing welfare (the first half of specification (1)), but a lower probability of being selected for welfare (the second half of specification (1)). Individuals in this age group are of working age and may be expected to be in the labour market. Thus, this may cause them to have a lower probability of being selected for welfare. Single persons who have less than high school education have a higher probability of choosing welfare. However, the level of education of a single person does not seem to have a significant effect on the administrator's selection decision. Females have a lower probability of choosing welfare than males. This is consistent with the labour force participation estimates where single females have a higher probability of working than single males.[25]

Regarding regional effects on welfare participation, the results show that single persons who live in Atlantic Canada have a higher probability of choosing welfare, *ceteris paribus*, than do single persons in Quebec, Ontario, and the Prairie region. This may indicate differences in the distaste for welfare across provinces. On the other hand, welfare administrators are more selective in the Atlantic region.

The estimated correlation coefficient between individual and administrator decisions (ρ) is negative (−0.6421) and significant, indicating that the error terms in the individual and welfare administrator decision equations have an inverse relationship. This implies that when single persons have a higher propensity to apply for welfare, welfare administrators are more likely to restrict their selection further than usual, perhaps to control government spending or to send a signal to single persons that getting welfare should not be their first choice.

---

[25] Labour force participation estimations are presented in Appendix E.

To investigate the importance of the correlation between individual and welfare administrator decisions, specification (2) in Table 3.15 is estimated with ρ restricted to equal zero. While the coefficient estimates have the same signs as in specification (1), the LR test in Table 3.17 rejects the hypothesis that there is no correlation between individual and administrator decisions (LR = 20.72). The LR test gives the same result for significance of ρ as the t-test in specification (1).

Specification (3) assumes that there is no role for administrative selection in determining the probability of welfare participation. This specification is similar to the welfare participation equations estimated by Allen (1993), Charette and Meng (1994), and Dooley (1996). The estimated coefficients somewhat differ from those in specification (1). The estimated coefficients on the age and education variables in specifications (1) and (3) have the same signs, but differ in magnitudes. The estimated coefficients on the province dummy variables have changed signs for both Quebec and Ontario. However, the most important change is the estimated coefficient on the welfare benefit. It becomes negative (–0.1715) and insignificant. This may be because the omission of administrative selection blurs the effect of welfare benefits. The effect of the unemployment rate is positive as found in other studies. Moreover, the LR test in Table 3.17 shows that the hypothesis that there is no administrative selection is rejected (LR = 548.04).

Specification (4) in Table 3.16 assumes that the individual's distaste for welfare and the administrator's selection criteria are the same across provinces. The results show that the magnitudes of the coefficients on the wage rate, welfare tax rate, welfare benefit, and unemployment rate are larger than those in specification (1). However, the hypothesis that there is no provincial difference in welfare participation is strongly rejected (LR = 571.48).

Specification (5) disaggregates post-secondary education (PS) into a diploma (DM) and a university degree (UNIV). In the first half of the results for specification (5), the coefficient estimates on the diploma and the university degree both have negative signs and are statistically significant. In the second half of the results for specification (5), the selection equation estimates, the coefficient estimate on the university degree variable is statistically significant and has a negative sign. Thus, these results imply that individuals with university degrees are less likely to apply for welfare and are less likely to be selected for welfare. The coefficient estimates on the high school education and diploma variables are not statistically significant in the S equation, while the LR test reported in Table 3.17 rejects the aggregation of the diploma and university degree variables.

Specification (6) disaggregates age group 27-46 into two age groups: 27-36 and 37-46. The results show that the estimated coefficients on these two age groups do not differ statistically in both the SA and S equations. However, the disaggregation increases the magnitude of the estimated coefficients on the wage rate, the welfare tax rate, the welfare benefit and average past income. A LR test (Table 3.17) cannot reject the hypothesis that the effects of age groups 27-36 and 37-46 on the probability of welfare participation are similar (LR = 3.54).

Therefore, in this sample, specification (5), the specification in which the education level is more disaggregated, provides a better explanation of welfare participation than do the other specifications.

ii) All Single Persons

For comparison purposes and to determine the significance of restricting the analysis to only those who are eligible for welfare, the model is also estimated using the data for both eligible and ineligible persons. The results for all single persons (eligible and ineligible) are presented in Tables 3.18 and 3.19. The reference case is again a single female who is younger than 27, who has less than high school education, and who lives in the Atlantic region. The size of this sample is 44,200, of which 12,993 observations (about 29 percent of the sample) are eligible for welfare and 1,229 observations (about 2.8 percent of the sample) are actually on welfare.

Specification (1) shows that the coefficient estimate on the wage rate is negative (–8.3846) and statistically significant. The magnitude of the wage rate parameter is larger in this sample than in the sample of eligible individuals. Thus, including the ineligible individuals in the analysis yields a stronger effect of the wage rate on the probability of applying for welfare.

As in the sample of eligible individuals only, a higher welfare tax rate reduces the probability of choosing welfare. The magnitude of the welfare tax rate parameter (–2.1648) is larger than for the eligible single person sample, which may indicate its strong disincentive effect on welfare participation among all single persons. In addition, the inclusion of ineligible persons reduces the effect of the welfare benefit and eliminates its significance.

Moreover, as with the sample of eligible individuals, specification (1) in Table 3.18 also shows that personal characteristics are important factors explaining welfare participation for all single persons. In general, the effects of age are similar to those obtained using data on only eligible single persons, except that the magnitude of the estimated coefficients tends to be smaller. This indicates that age may be less important in explaining welfare participation when all single persons are included. In addition, the effects of the province dummy variables on both individual and administrator decisions are also generally similar to those obtained for eligible single persons, except that the effect of the Quebec dummy variable on the probability of applying for welfare becomes positive, but insignificant.

The correlation between individual and administrator decisions (ρ) is close to one and statistically significant. This indicates that a single person who has a higher propensity to choose welfare is also more likely to be selected for welfare. This result is opposite to that of the case in which only data on eligible individuals is employed.

To summarize, personal characteristics and province of residence have significant effects on the welfare participation of eligible and ineligible single persons. For eligible single persons, the wage rate and the welfare tax have negative effects on welfare participation. A higher welfare benefit increases the attractiveness of welfare and the probability of applying for welfare. In addition, average individual's past income, a business cycle variable, and the fiscal variable affect welfare participation through administrative selection. The omission of administrative selection leads to an incorrect parameter estimate for the effect of the welfare benefit as shown in Christofides *et al.* (1997). Finally, the inclusion of ineligible single persons affects the magnitudes of the parameter estimates. The effects of the wage rate and the tax rate become larger, whereas the effect of the welfare benefit becomes smaller or insignificant.

3.5.2 Single Parents

i) Eligible Single Parents

A list of explanatory variables included in the model for the single parent sample is shown in Table 3.15. The results for eligible single parents are presented in Tables 3.21, 3.22, and 3.23. The reference case is a single mother who is younger than 27, who has less than high school education, who has no child below age two and who lives in the Atlantic region.

The results in specification (1) in Table 3.21 show that the wage rate and welfare tax rate have a significant negative impact on the probability of choosing welfare (–6.4894 and –1.8981). A higher wage rate may induce single parents to work more. As a consequence, their earnings may increase and they may leave welfare. A higher tax rate reduces the probability of choosing welfare. A higher tax rate indicates a higher clawback and this may discourage single parents from choosing welfare since they may feel that their earnings are taxed at a very high rate. The magnitude of the wage rate and welfare tax rate effects for the eligible single parent sample is larger than that in the eligible single person sample. This indicates that single parents respond more to changes in the wage rate and the welfare tax rate, perhaps because a larger proportion of eligible single parents is in the labour market (Table 3.10).

The coefficient estimate on the welfare benefit has a negative sign (–0.3827), but it is insignificant. This may be due to the omission of relevant variables, such as certain age groups. The result when more age groups are included in the estimating equation is presented in specification (6) and will be discussed subsequently.

The coefficient estimate on average past income has a negative sign as expected. Single parents who had a high average income in the past six months have a lower probability of being selected for welfare. A higher average past income may be an indication of a high future income if an individual works.

The coefficient estimate on the unemployment rate indicates a significant impact of the unemployment rate on the probability of welfare participation for single parents. A lower unemployment rate does not reduce the probability of applying for welfare, but it does decrease the probability of being selected for welfare. This result is similar to that for the eligible single person sample.

The coefficient estimate on per-capita income has a positive sign and is statistically significant. High provincial per-capita income increases a single parent's probability of being selected for welfare. This may be because people living in a well-off province are able to support poor families. They may, however, choose to support single persons with dependents rather than single persons without dependents.

The fiscal variable is also an important determinant of welfare participation. The sign of the estimated coefficient on the ratio of the government deficit to GDP is positive which is opposite to the prediction. This may indicate that government support to single persons with dependents is still a priority even in a period of high deficits.

Personal characteristics such as age, education and gender, and the number of children by age group have statistically significant effects on an individual's welfare participation decision. Also age, education, having children below age two, and the number of children have statistically significant effects on the welfare administrator's selection decision. Specifically, single parents who are older than 26 and have at least high school education have a lower probability of choosing welfare and a lower probability of being selected for welfare. This is consistent with the hypothesis that older and well-educated individuals tend to be more inhibited about receiving welfare and that welfare administrators believe they are capable of working. Single mothers have a higher probability of choosing welfare than do single fathers. This may be because single mothers tend to be very young females who are less competitive in the job market. However, gender does not seem to affect administrative selection.

The estimated coefficient on the number of children shows that this variable has a positive effect on welfare participation. Single parents who have more children have a higher probability of choosing welfare, probably because they are more needy. The number of children below age 5 (TKID05) has a stronger effect on the probability of applying for welfare than the number of children aged 6-24 (TKID624). This may be explained by differences in availability for work and the cost of childcare. Since single parents who have children younger than 5 years may have less flexibility in terms of work availability, and since the cost of childcare may be relatively high compared to their earnings, they may be more inclined to depend on welfare.

The total number of children (KID) also affects the probability of being selected for welfare. However, it has an unexpected sign; that is, having more children reduces the probability of being selected for welfare. In addition, the results show that having children below two years of age increases the probability of being selected for welfare.

The estimated region coefficients show that single parents who live in the Atlantic region have a higher probability of choosing welfare, probably because public assistance is more common in that region. On the supply side, the results show that, during the period 1989-90, welfare administrators in British Columbia may have been more selective than welfare administrators in the other provinces. There is no statistical difference in administrative selection among the other provinces.

The last coefficient estimate in specification (1) is the correlation between individual and administrator decisions (ρ). It is positive (0.0630), but statistically insignificant. As a result, specification (2) where ρ is set to zero yields similar results to specification (1). This inference may be due to the omission of some variables. The results with more variables will be explained subsequently. Nonetheless, the LR test in Table 3.23 cannot reject the hypothesis that ρ is zero (LR = 0.26).

Since the results in specification (2) are quite similar to those in specification (1), the discussion of this specification is omitted.

Specification (3) in Table 3.21 is estimated under the assumption that there is no role for administrative selection in determining welfare participation. Welfare participation is, therefore, only a result of the individual's decision. The results in specification (3) show that the estimated coefficients on the wage rate, the welfare tax rate, and the welfare benefit all have negative signs (−10.1240, −1.2986, and −0.2402, respectively) and are statistically significant. The estimated coefficient on the unemployment rate has a positive sign. However, it should be noted that these inferences may be incorrect as relevant covariates in the administrative selection equation are omitted.

Personal characteristics are significant factors that determine the probability of applying for welfare of eligible single parents in specification (3). These results are quite similar to specification (1).

The coefficient estimates on the regional variables are not individually statistically significant in specification (3). This result differs from the LR test of specification (4) (Table 3.22). Specification (4) estimates the two components of the welfare decision simultaneously without including the province dummy variables. When testing whether province of residence determines welfare participation, the LR test (Table 3.23) shows that we reject the hypothesis that there are no regional effects on welfare participation (LR = 98.5). This suggests that the insignificance of the province dummy variables in specification (3) may be due to the omission of the administrative selection equation.

There are several differences in the parameter estimates in specification (1) and specification (4) when the province dummy variables are deleted. The effect of the wage rate on an individual's decision is larger and the estimated coefficient on the welfare benefit is negative and statistically significant. Additionally, the unemployment rate does not affect the probability of choosing welfare.

Specification (5) is estimated by separating the post-secondary education variable into a diploma variable and university degree variable (Table 3.22). The results show that single parents who have a diploma have a lower probability of choosing welfare, but have a higher probability of being selected for welfare. The coefficient estimate on the university degree variable is not significant in the SA equation, but it is significant in the S equation. That is, single parents who have a university degree have the lowest probability of being selected for welfare.

Compared to specification (1), disaggregating the post-secondary education variables causes a change in the sign of the coefficients on the welfare benefit, gender, and the number of children variables. The coefficient estimate on the welfare benefit becomes positive (0.0224), but insignificant. Single fathers have a lower probability of being selected for welfare in this specification. Moreover, an increase in the number of children has a positive effect on the probability of being selected for welfare. These effects tend to be consistent with the predictions of the theoretical model.

The hypothesis that the effects of the diploma and university degree variables on the probability of welfare participation are identical is rejected (Table 3.23). The computed LR test statistic is equal to 44.46 whereas the critical value is equal to 5.991.

The last results in Table 3.22 are the estimates for the case which allows for different effects of age groups 27-36 and 37-46 on welfare participation. Both age groups have a negative impact on the probability of applying for welfare. However, single parents in age group 37-46 have a lower probability of choosing welfare whereas single parents in age group 27-36 have a lower probability of being selected for welfare. These results are consistent with the predictions that older individuals may have a higher distaste for welfare, while welfare administrators may want young individuals to be involved in the labour market rather than dependent on welfare.

Comparing the results for specification (6) to those for specification (1), the signs of the parameter estimates on education, the wage rate, the welfare tax rate, having children below age 2, average past income, business cycle effects, and the fiscal variable do not change. However, the effect of the welfare benefit becomes positive and significant as predicted by the theory. Therefore, specification (6) is comparably better than the other specifications.

A puzzling feature of this specification is that the coefficient estimates on the number of children age 0-5 and 6-24 have negative signs in the SA equation, which is contrary to the prediction. On the other hand, the number of children has a positive impact on the probability of being selected for welfare, which is as predicted.

As in the previous specifications, an LR test is used to test whether the disaggregated age groups have a significantly different impact on welfare participation when compared to specification (1). Since the LR test statistic is equal to 202.18, this test rejects specification (1). Therefore, the specification which includes disaggregation of the age group variable provides better parameter estimates than specification (1).

To sum up the results for single parents, personal and household characteristics (such as age, education, gender, and the number of children by age group), regional effects, the wage rate, welfare parameters (such as the welfare tax and welfare benefit), and the unemployment rate determine the probability of choosing welfare. The effects of the wage rate, the welfare tax rate, and the welfare benefit on the probability of applying for welfare are consistent with theoretical predictions when the age group variable is disaggregated. The results concerning the effects of the wage rate and benefit rate are similar to that of Charette and Meng (1994) and Dooley (1996). However, in those two studies the effect of the welfare tax rate is not statistically significant.

Personal characteristics, regional effects, the number of children, having children below age two, past income, business cycles effects (per-capita income and the unemployment rate), and the fiscal variable (the ratio of the government deficit to GDP) determine the administrator's selection decision. The effects of per-capita income and the ratio of the government deficit to GDP on the administrator's selection decision and on the individual's welfare participation decision are opposite to the results obtained for single persons. This, however, may indicate that family status is an important determinant of administrative selection. Welfare administrators may actually select welfare applicants differently according to their family status.

ii) All Single Parents

The results for all (eligible and ineligible) single parents are shown in Tables 3.24 and 3.25. There are 17,085 observations in this sample. Among them, 3,433 observations (about 20 percent of the sample) are ineligible for welfare. The reference case is the same as that used in the eligible single parent sample.

The results in specification (1) show that the coefficient estimates on the wage rate and the tax rate have negative signs (–13.8610 and –2.2843) and are statistically significant. The coefficient estimate on the welfare benefit is positive (0.1302), but not statistically significant. The magnitudes of the coefficients on the wage rate and the tax rate are larger than for the eligible sample, as in the case of single persons.

The business cycle variables and a fiscal variable have similar effects to those observed for eligible single parents. As with those results, individual and household characteristics are important determinants of the probability of applying for welfare. However, the effects of the number of children by age group (TKID05 and TKID624) on the probability of choosing welfare are now insignificant.

To summarize the results for the combined sample, personal and household characteristics, the wage rate, welfare variables, regional effects, average past income, the business cycle variables, and the fiscal variable determine welfare participation for all single parents. Including ineligible single parents in the sample has two major impacts on the coefficient estimates of the welfare participation model. First, the wage rate and the tax rate have a stronger impact on welfare participation. This may be because the inclusion of ineligible single parents increases the average wage rate and tax rate and, consequently, the magnitude of their effects. Second, a higher welfare benefit does not necessarily increase the welfare participation of single parents. This may be because ineligible single parents do not respond to changes in the benefit rate. In addition, single parents may be more needy and, thus, even though the welfare benefit is reduced, they may have no alternative but to continue collecting welfare.

3.6 Conclusions

In this study, each individual's monthly earnings and potential welfare benefits are used to compute the individual's monthly welfare eligibility. We have found that only 9 percent of single persons and 29 percent of single parents who are eligible in each month take up welfare. Even though the Canadian welfare program is more generous than its U.S. counterpart, the take-up rate is low compared to the AFDC where the take-up rate was 68-75 percent during 1986 and 1987 (Blank and Hanratty, 1993, and Blank and Ruggles, 1996). A low welfare take-up rate in Canada could be the result of individuals' welfare participation decisions being constrained by welfare administrators' selection decisions.

To test the role of administrative selection, a new model of welfare participation has been developed. In this model, both individual and welfare administrator decisions influence welfare participation. Given that an individual chooses to apply or to be on welfare, welfare participation depends both on administrative selection and an eligibility requirement. The existence of the eligibility requirement is a good reason to estimate the welfare participation model using data on eligible persons only, although for comparison purposes data on all persons are also used to estimate the parameters of the model.

The empirical results show that the wage rate, the welfare tax rate, the welfare benefit, personal and household characteristics, and province of residence are significant factors determining an individual's welfare participation decision. The wage rate and the welfare tax rate have a negative impact on the probability that an individual will choose to participate in welfare. Moreover, when ineligible individuals are included in the data set, the coefficient estimates on the wage rate and the welfare tax rate have a larger negative impact on the probability of applying for welfare.

As predicted by the theoretical model, the welfare benefit has a positive impact on an individual's welfare participation decision. This suggests that a higher welfare benefit increases the attractiveness of welfare. However, this may not be true for single parents as the probability of applying for welfare does not always decrease with a lower benefit rate. This may be because single parents are more needy and they may have no better options even when welfare benefits are low. Therefore, lowering the benefit rate may not be a good policy to reduce the welfare participation of single parents.

On the supply side, the results show that the factors that determine administrative selection are personal and household characteristics, an individual's past income, provincial per-capita income, the unemployment rate, and the ratio of the government deficit to GDP. Individuals who have high past incomes might have the potential to earn more and be self-sufficient. Therefore, they are less likely to be selected for welfare. Provincial per-capita income and the ratio of the government deficit to GDP have a positive impact on a single parent's probability of being selected for welfare, but have a negative impact on a single person's probability of being selected for welfare. People living in a rich province may be more willing to support single parents. By the same token, the government may have more sympathy for single parents than for single persons. These results imply that family status does matter in determining an individual's probability of being selected for welfare.

Business cycle effects also have a significant impact on welfare participation. A higher unemployment rate reduces the probability of choosing welfare, but increases the probability of being selected for welfare. When the unemployment rate is high, welfare administrators may expect that potential income is low and so may accept more people into welfare. However, these people may become reliant on welfare benefits and may not want to leave welfare when the unemployment rate improves.

The results in this study reject the hypothesis that there is no role for administrative selection in welfare participation. Both the individual's decision and the administrator's selection decision are significant determinants of Canadian welfare participation. For example, when there is no administrative selection in the estimated model, the effect of the welfare benefit on welfare participation always has a negative sign. This indicates that the omission of administrative selection may lead to an incorrect inference. In addition, we have found that an individual's decision to apply for welfare and the administrator's selection decision are inter-dependent. During periods in which there are many welfare applicants, welfare administrators may be more selective with respect to single persons, but not with respect to single parents.

The economic significance of the estimation results can be examined by simulating the change in the number of welfare participants predicted by the estimated model following changes in several of the independent variables. Using specifications that yield results consistent with the theory (specification (5) for eligible single persons and specification (6) for eligible single parents), an increase in the benefit rate of 20 percent increases the number of single-person welfare recipients by 6.12 percent and of single-parent welfare recipients by 3.23 percent (Table 3.27).[26] A reduction in the tax rate of 20 percent has no impact on the number of single-person welfare recipients, but increases the number of single-parent welfare recipients by 4.80 percent. Therefore, the benefit rate has a stronger effect on single-person welfare participation decision, but the tax rate has a stronger effect on single-parent welfare participation decision. This most likely is because most eligible single persons do not work and, thus, the welfare tax rate is less likely to affect their welfare decisions. Even if the welfare tax is eliminated, the number of single-person welfare recipients increases by only 5.97 percent. These results suggest that a benefit increase induces more eligible single persons, but a reduction in the welfare tax rate induces more eligible single parents to participate in welfare.

An increase in per-capita income of 20 percent reduces the number of single-person welfare recipients by 10.90 percent, but increases the number of single-parent welfare recipients by 10.84 percent. A rise in the government deficit to GDP ratio reduces the number of single-person welfare recipients by 4.48 percent, but increases the number

[26] An individual is predicted to be on welfare if the predicted probability of their welfare participation is greater than 0.5.

of single-parent welfare recipients by 5.43 percent. This implies that the change in per-capita income and the ratio of the government deficit to GDP not only affect the administrator's selection (as explained earlier), but also the administrator's decision to redistribute social assistance among single persons and single parents. During a boom period and/or a high budget deficit period, welfare administrators redistribute welfare toward single-parent households.

This study is limited to the extent that additional control variables, such as poverty line measures and the marginal income tax rate, cannot be added to the administrative selection equation due to the lack of variability in the data. As a result, there might be some systematic effects that are left unexplained. This limitation may be the result of using a data set that covers a short time period and which contains only a small proportion of welfare recipients. In the future, when better data sets are available, we may be able to add more fiscal variables to improve the robustness of the administrative selection equation.

Table 3.1 Total Observations in LMAS Job File Classified by Class of Workers

Class of workers	Number	Percent
No job	9,582	9.9
Paid worker	76,763	79.1
Unpaid family worker	608	0.6
Incorporated business-with paid help	1,769	1.8
Incorporated business-no paid help	444	0.5
Not incorporated business-with paid help	1,627	1.7
Not incorporated business-no paid help	6,162	6.3
Self-employed, not specified	126	0.1
Total	97,081	100.0

Table 3.2 Paid Workers and Unemployed Individuals[1]

(as percentage of total observations[2])

Category	1989	1990
Household characteristic		
1. No spouse, no children.	[illegible]	[illegible]
2. Spouse is present, no children.	25.6	26.5
3. Spouse is present, there are children.	53.9	52.1
4. No spouse, there are children.	6.0	6.8
Disability status		
1. Not disabled	82.5	82.4
2. Disabled and prevented from working	9.2	9.1
3. Disabled but not known if limited at work	0.7	0.8
4. Disabled but not limited at work	5.5	4.6
5. Not stated	2.1	3.1
Age group[3]		
1. 18 years		2.5
2. 19-21 years		6.9
3. 22-26 years		10.5
4. 27-36 years		25.8
5. 37-46 years		22.0
6. 47-56 years		14.4
7. 57-66 years		12.4
8. above 66 years		5.6
Family relationship to head		
1. Head	48.6	51.8
2. Spouse	34.8	34.1
3. Son-daughter	14.9	12.7
4. Parent (in-law)	0.2	0.2
5. Son-daughter (in-law)	0.2	0.2
6. Other relative	1.2	1.1
Pension income		
1. Have pension income	12.3	13.4
2. No pension income	87.7	86.6
Full-time student		
1. Did not attend school	88.8	[illegible]
2. Attended school less than 8 months	4.1	[illegible]
3. Attended school more than 8 months	7.2	5.3

Note: [1] Individuals are only included in this study if they are included in a shaded category for each subsection of this table.

[2] Total observations is 50,375.

[3] This is the age group as of 1990. Age group in the LMAS 1988-90 data refers to the 1988 reference year. Age groups in the LMAS data are: 16 years; 17-19 years; 20-24 years; 25-34 years; 35-44 years; 45-54 years; 55-64 years; and 65-69 years.

Table 3.3 Eligible and Ineligible Single Persons

Category	Nfld.	PEI	NS	NB	Que.	Ont.	Man.	Sask.	Alta.	BC	Total
Age group (% of column)											
1. below 27	11.7	19.4	26.4	23.1	14.6	17.5	26.7	24.1	24.7	22.5	20.7
2. 27-36	35.6	37.5	34.8	30.7	33.6	42.2	39.0	38.4	41.2	33.8	37.4
3. 37-46	27.8	18.7	16.8	20.0	24.8	20.2	19.1	15.5	17.2	23.1	20.5
4. 47-56	17.6	15.0	13.1	16.2	14.7	11.5	8.4	15.7	11.9	14.7	13.3
5. above 57	7.3	9.4	9.0	10.0	12.3	8.6	6.8	6.3	5.1	5.9	8.2
Education (% of column)											
1. less than HS[1]	21.4	36.8	23.4	20.4	27.1	14.6	19.1	16.4	16.7	17.1	19.6
2. HS	16.6	31.3	23.2	28.5	26.6	33.2	39.1	39.3	37.4	39.6	33.1
3. Diploma	38.1	20.0	32.5	25.4	26.6	25.7	23.5	26.5	25.6	26.2	26.4
4. University	23.9	11.9	20.9	25.8	19.7	26.6	18.3	17.8	20.3	17.0	20.9
Gender (% of column)											
1. Female	39.5	34.4	41.4	48.2	48.2	46.7	46.0	46.9	40.2	38.3	44.2
2. Male	60.5	65.6	58.6	51.8	51.8	53.3	54.0	53.1	59.8	61.7	55.8
Visible minority status (% of column)											
1. No	100.0	100.0	96.6	98.7	97.8	96.5	94.0	99.6	96.1	93.5	96.7
2. Yes	0	0	3.4	1.3	2.2	3.5	6.0	0.4	3.9	6.5	3.3
Social assistance (% of column)											
1. No	97.0	96.3	98.8	97.1	91.3	98.7	98.7	99.2	99.5	98.1	97.2
2. Yes	3.0	3.7	1.2	2.9	8.7	1.3	1.3	0.8	0.5	1.9	3.3
Average value ($)											
1. real benefit	311	602	469	316	427	631	556	421	553	613	518
2. current income	753	557	698	774	790	929	831	844	967	963	864
3. past income	632	469	600	661	678	793	710	720	821	817	737
4. future income	779	571	711	787	794	942	848	853	985	976	877
Total observations	1161	907	2466	2551	8415	8850	3232	3795	7062	5761	44200

Note: [1] HS = high school.

Table 3.4 Single Persons Who Are on Welfare

Category	Nfld.	PEI	NS	NB	Que.	Ont.	Man.	Sask.	Alta.	BC	Total
Age group (% of column)											
1. below 27	0	0	62.1	2.7	1.5	3.6	17.1	6.7	21.6	29.9	6.8
2. 27-36	0	0	17.2	11.1	17.6	52.7	41.5	0	16.2	0.9	18.3
3. 37-46	0	50.0	0	1.4	29.4	24.1	0	0	0	15.9	22.5
4. 47-56	48.6	50.0	20.7	23.3	27.9	19.6	41.5	93.3	2.7	53.3	31.4
5. above 57	51.4	0	0	61.6	23.5	0	0	0	59.5	0	20.9
Education (% of column)											
1. less than HS[1]	100.0	50.0	20.7	89.0	64.0	41.1	51.2	63.3	75.7	42.1	61.0
2. HS	0	50.0	62.1	11.0	21.3	13.4	22.0	36.7	8.1	36.4	22.5
3. Diploma	0	0	17.2	0	13.1	32.1	26.8	0	16.2	21.5	14.4
4. University	0	0	0	0	1.5	13.4	0	0	0	0	2.1
Gender (% of column)											
1. Female	0	50.0	58.6	47.9	41.9	42.9	9.8	0	64.9	42.1	40.4
2. Male	100.0	50.0	41.4	52.1	58.1	57.1	90.2	100.0	35.1	57.9	59.6
Visible minority status (% of column)											
1. No	100.0	100.0	41.4	100.0	96.2	90.2	100.0	100.0	100.0	99.1	95.4
2. Yes	0	0	58.6	0	3.8	9.8	0	0	0	0.9	4.6
Average value ($)											
1. real benefit	284	519	440	220	380	501	415	375	371	424	389
2. current income	0	0	91	42	72	209	54	113	50	55	78
3. past income	0	0	97	28	90	226	56	151	211	109	99
4. future income	0	0	27	54	85	332	63	105	210	94	104
Total observations	35	34	29	73	731	112	41	30	37	107	1229

Table 3.5 Eligible and Ineligible Single Parents

Category	Nfld.	PEI	NS	NB	Que.	Ont.	Man.	Sask.	Alta.	BC	Total
Age group (% of column)											
1. below 27	15.2	8.8	11.3	10.3	8.1	9.3	3.2	11.6	4.9	8.0	8.7
2. 27-36	22.9	38.8	30.6	23.2	28.9	31.2	30.0	46.5	41.4	32.7	32.5
3. 37-46	36.7	41.2	40.3	47.0	45.2	46.5	51.1	27.9	42.2	43.4	43.2
4. 47-56	20.6	11.2	17.7	19.5	14.0	11.2	14.2	9.3	10.6	14.2	13.5
5. above 57	4.6	0	0	0	3.8	1.9	1.6	4.7	0.8	1.8	2.1
Education (% of column)											
1. less than HS	57.3	26.2	29.0	34.0	38.6	30.4	38.4	28.7	17.7	21.8	31.0
2. HS	26.7	40.1	34.9	31.3	35.9	35.7	27.9	43.0	38.1	45.4	36.5
3. Diploma	13.7	26.2	24.2	23.7	17.4	21.3	24.2	16.3	35.2	20.4	22.1
4. University	2.3	7.5	11.9	11.1	8.1	12.7	9.5	12.0	9.0	12.4	10.3
Gender (% of column)											
1. Female	84.0	85.0	85.5	82.8	86.0	85.6	85.8	88.4	88.6	82.3	85.6
2. Male	16.0	15.0	14.5	17.2	14.0	14.4	14.2	11.6	11.4	17.7	14.4
Visible minority status (% of column)											
1. No	100.0	96.3	91.9	98.9	95.2	89.8	93.7	100.0	97.5	93.8	94.8
2. Yes	0	3.7	8.1	1.1	4.8	10.2	6.3	0	2.5	6.2	5.2
Average number of children											
1. age 0-2 yr.	0.10	0.14	0.10	0.13	0.12	0.12	0.06	0.07	0.10	0.11	0.11
6. age 3-5 yr.	0.13	0.13	0.17	0.15	0.14	0.21	0.18	0.29	0.15	0.20	0.18
7. age 6-15 yr.	0.76	0.76	0.90	0.72	0.82	0.94	1.01	1.05	1.07	1.03	0.92
8. age 16-24 yr.	0.85	0.46	0.44	0.65	0.44	0.51	0.57	0.30	0.34	0.39	0.47
Social assistance (% of column)											
1. No	69.5	74.7	73.5	72.4	71.8	78.0	78.1	84.5	82.2	77.1	76.6
2. Yes	30.5	25.3	26.5	27.6	28.2	22.0	21.9	15.5	17.8	22.9	23.4
Average value ($)											
1. real benefit	1144	909	934	915	811	1293	867	1102	1059	1141	1043
2. current income	428	520	564	472	476	647	674	667	808	691	610
3. past income	347	437	475	401	402	557	578	571	687	578	518
4. future income	458	546	581	476	488	646	678	682	820	725	622
Total observations	742	454	1054	1484	3156	3656	1077	1462	2079	1921	17085

Table 3.6 Single Parents Who Are on Welfare

Category	Nfld.	PEI	NS	NB	Que.	Ont.	Man.	Sask.	Alta.	BC	Total
Age group (% of column)											
1. below 27	31.9	29.6	36.2	30.1	21.0	30.5	5.1	26.4	13.8	19.4	24.3
2. 27-36	16.4	40.9	30.5	24.7	44.2	49.7	34.3	44.9	47.6	56.5	41.8
3. 37-46	30.5	29.6	29.4	35.7	29.7	16.9	38.1	20.7	26.5	20.3	26.4
4. 47-56	13.7	0	3.9	9.5	5.1	2.1	22.5	0.4	12.2	3.9	6.5
5. above 57	7.5	0	0	0	0	0.7	0	7.5	0	0	1.0
Education (% of column)											
1. less than HS	57.1	34.8	43.0	53.8	63.7	58.4	76.7	53.3	45.9	40.3	54.9
2. HS	28.3	35.7	31.9	36.7	29.7	29.6	14.0	39.2	35.9	40.1	32.0
3. Diploma	14.6	29.6	19.0	9.5	6.5	7.7	9.3	7.5	13.5	16.2	11.0
4. University	0	0	6.1	0	0	4.2	0	0	4.6	3.4	2.1
Gender (% of column)											
1. Female	100.0	100.0	98.2	91.8	96.1	97.4	100.0	99.6	95.4	96.1	96.7
2. Male	0	0	1.8	8.3	3.9	2.6	0	0.4	4.6	3.9	3.3
Visible minority status (% of column)											
1. No	100.0	100.0	91.8	100.0	94.3	87.2	97.0	100.0	97.0	100.0	95.1
2. Yes	0	0	8.2	0	5.7	12.8	3.0	0	3.0	0	4.9
Average number of children											
1. age 0-2 yr.	0.24	0.20	0.24	0.32	0.28	0.29	0.17	0.02	0.26	0.26	0.25
6. age 3-5 yr.	0.24	0.15	0.27	0.25	0.21	0.43	0.33	0.56	0.31	0.39	0.32
7. age 6-15 yr.	0.89	0.91	0.57	0.77	0.74	1.03	1.01	1.15	1.04	1.46	0.95
8. age 16-24 yr.	0.50	0.50	0.33	0.39	0.33	0.13	0.60	0.18	0.29	0.08	0.29
Average value ($)											
1. real benefit	1125	908	832	868	780	1203	823	1131	1043	1183	992
2. current income	76.7	163.1	80.2	113.1	36.0	101.6	109.6	239.6	262.1	188.4	120
3. past income	60.0	134.5	65.9	93.4	29.8	94.0	76.3	213.0	225.6	146.2	100
4. future income	100.8	191.7	107.0	138.5	42.6	100.1	124.0	224.9	289.1	240.8	136
Total observations	226	115	279	409	891	803	236	227	370	439	3995

Table 3.7 Number of Single Persons Eligible for Welfare.

	Not on Welfare	On Welfare	Total
Single Persons	**42,971**	**1,229**	**44,200**
Ineligible	31,142	65	31,207
Eligible	11,829	1,164	12,993
Single persons by province			
Newfoundland	**1,126**	**35**	**1,161**
Ineligible	835	0	835
Eligible	291	35	326
Prince Edward Island	**873**	**34**	**907**
Ineligible	285	0	285
Eligible	588	34	622
Nova Scotia	**2,437**	**29**	**2,466**
Ineligible	1,707	4	1,711
Eligible	730	25	755
New Brunswick	**2,478**	**73**	**2,551**
Ineligible	1,895	5	1,900
Eligible	583	68	651
Quebec	**7,684**	**731**	**8,415**
Ineligible	5,836	35	5,871
Eligible	1,848	696	2,544
Ontario	**8,738**	**112**	**8,850**
Ineligible	5,354	9	5,363
Eligible	3,384	103	3,487
Manitoba	**3,191**	**41**	**3,232**
Ineligible	2,618	2	2,620
Eligible	573	39	612
Saskatchewan	**3,765**	**30**	**3,795**
Ineligible	3,268	6	3,274
Eligible	497	24	521
Alberta	**7,025**	**37**	**7,062**
Ineligible	5,913	2	5,915
Eligible	1,112	35	1,147
British Columbia	**5,654**	**107**	**5,761**
Ineligible	3,431	2	3,433
Eligible	2,223	105	2,328

Table 3.8 Number of Single Parents Eligible for Welfare

	Not on Welfare	On Welfare	Total
Single Parents	**13,090**	**3,995**	**17,085**
Ineligible	3,419	14	3,433
Eligible	9,671	3,981	13,652
Single parents by province			
Newfoundland	**516**	**226**	**742**
Ineligible	67	0	67
Eligible	449	226	675
Prince Edward Island	**339**	**115**	**454**
Ineligible	20	0	20
Eligible	319	115	434
Nova Scotia	**775**	**279**	**1,054**
Ineligible	289	0	289
Eligible	486	279	765
New Brunswick	**1,075**	**409**	**1,484**
Ineligible	258	0	258
Eligible	817	409	1,226
Quebec	**2,265**	**891**	**3,156**
Ineligible	767	1	768
Eligible	1,498	890	2,388
Ontario	**2,853**	**803**	**3,656**
Ineligible	190	0	190
Eligible	2,663	803	3,466
Manitoba	**841**	**236**	**1,077**
Ineligible	441	2	443
Eligible	400	234	634
Saskatchewan	**1,235**	**227**	**1,462**
Ineligible	406	11	417
Eligible	829	216	1,045
Alberta	**1,709**	**370**	**2,079**
Ineligible	844	0	844
Eligible	865	370	1,235
British Columbia	**1,482**	**439**	**1,885**
Ineligible	137	0	137
Eligible	1,345	439	1,784

Table 3.9 Eligible Persons Classified by SA Status and Income Ranges

	Single Persons			Single Parents		
	SA = 0	SA = 1	Total	SA = 0	SA = 1	Total
income = 0	5,090	1,088	**6,178**	1,906	2,857	**4,763**
income > 0 & income ≤ I_x	174	5	**179**	108	64	**172**
income > I_x	6,565	71	**6,636**	7,652	1,060	**8,717**
Total	**11,829**	**1,164**	**12,993**	**9,671**	**3,981**	**13,652**

Note: SA is social assistance: SA = 0 means not on SA, SA = 1 means on SA.

Table 3.10 Number of Welfare Recipients in Three Income Ranges by Province

Province	Single Persons				Single Parents			
	income = 0	income > 0 & income ≤ I_x	income > I_x	Total	income = 0	income > 0 & income ≤ I_x	income > I_x	Total
Nfld.	35	0	0	35	193	0	33	226
PEI	34	0	0	34	74	0	41	115
NS	25	0	4	29	213	0	66	279
NB	68	0	5	73	302	22	85	409
Que.	673	3	55	731	790	0	101	891
Ont.	67	0	45	112	617	5	181	803
Man.	35	2	4	41	186	11	39	236
Sask.	24	0	6	30	102	0	125	227
Alta.	34	0	3	37	163	11	207	370
BC	93	0	14	107	217	26	196	439
Total	1,088	5	71	1,164	2,857	64	1,060	3,981

Table 3.11 The Effect of the Program Parameters on Welfare Eligibility

	Single Persons		Single Parents	
	number of eligible persons	% change	number of eligible persons	% change
Base case	12,993		13,652	
Benefit rate increases by 10%	14,187	9.19	14,195	3.98
Welfare tax increases by 10%	12,084	-7.00	13,277	-7.49
Earned income exemption increases by 10%	13,123	1.00	13,709	0.42

Table 3.12 List of Variables

Variables
Age group
AGE2 = 1 if individual is younger than 27 (reference case) in 1990.
AGE27 = 1 if individual is 27-36 years of age in 1990.
AGE37 = 1 if individual is 37-46 years of age in 1990.
A2746 = 1 if individual is 27-46 years of age in 1990.
A4765 = 1 if individual is 47-65 years of age in 1990.
Education
LHS = 1 if individual has less than high school education (reference case).
HS = 1 if individual completed high school or has some post-secondary education.
PS = 1 if individual has diploma or university degree.
DM = 1 if individual has post-secondary cert., diploma or trades cert.
UNIV = 1 if individual has university degree.
Gender
GENDER = 1 if individual is male.
Province of residence
ATLANTIC = 1 if individual lives in Newfoundland, Prince Edward Island, Nova Scotia or New Brunswick (reference case).
PRAIRIE = 1 if individual lives in Manitoba, Saskatchewan or Alberta.
QUE = 1 if individual lives in Quebec.
ONT = 1 if individual lives in Ontario.
BC = 1 if individual lives in British Columbia.
Number of children
KID = total number of children.
KID02 = 1 if individual has own kids age 0-2.
TKID05 = number of own kids age 0-2.
TKID624 = number of own kids age 6-24.
Labour and income variables
RY_6 = average real earnings from all paid jobs in the previous six months. (unit: $10,000)
W2 = real wages without the inverse Mill's ratio included in wage prediction. (unit: $100)
Welfare variables
P = 1 if individual is on social assistance.
RB = net real benefit = $B_i' + tI_x$. (unit: $1,000)
TAX = marginal welfare tax rate (t).
Provincial-related variables
DEFGDP = the ratio of the government deficit to GDP.
PERY = per-capita income (unit: $10,000).
UNEMPR = the monthly unemployment rate/100.

Table 3.13 Explanatory Variables for the Single-Person Sample

Variable	Mean: eligible single persons	Mean: all single persons	X_{SAi} (eq. 3.22, 3.24 and 3.25)	X_{Si} (eq. 3.22 and 3.24)
A2746	0.4679	0.5785	√	√
A4765	0.2659	0.2146	√	√
HS	0.3676	0.3310	√	√
PS	0.3493	0.4731	√	√
GENDER	0.5087	0.5585	√	√
QUE	0.1958	0.1904	√	√
ONT	0.2684	0.2002	√	√
PRAIRIE	0.1755	0.3188	√	√
BC	0.1792	0.1303	√	√
W2	0.0628	0.1146	–	
TAX	0.4461	0.7794	–	
RB	0.4619	0.5177	+	
UNEMPR	0.0848	0.0837	+	√
RY_6	0.0303	0.0737		–
PERY	0.1648	0.1977		√
DEFGDP	–0.0853	0.0768		–

Note: A +, – or √ symbol in the last two columns indicates that the corresponding variable is included in the estimation of the equation to which that column refers. A negative or positive symbol indicates the expected sign for that parameter, while a checkmark (√) indicates that the sign is not unambiguously predicted by the model.

Table 3.14 Explanatory Variables for the Single-Parent Sample

Variable	Mean: eligible single parents	Mean: all single parents	X_{SAi} (eq. 3.22, 3.24 and 3.25)	X_{Si} (eq. 3.22 and 3.24)
A2746	0.7470	0.7572	√	√
A4765	0.1470	0.1562	√	√
HS	0.3802	0.3655	√	√
PS	0.2653	0.3242	√	√
GENDER	0.1075	0.1443	√	√
QUE	0.1749	0.1847	√	√
ONT	0.2539	0.2140	√	√
PRAIRIE	0.2134	0.2703	√	√
BC	0.1307	0.1124	√	√
TKID05	0.3227	0.2856	√	
TKID624	1.4310	1.3860	√	
KID	1.7350	1.6560		√
KID02	0.1144	0.0985		√
W2	0.0841	0.1033	–	
TAX	0.5747	0.6489	–	
RB	1.0680	1.0430	+	
UNEMPR	0.0870	0.0868	+	√
RY_6	0.0373	0.0518		–
PERY	0.1617	0.1938		√
DEFGDP	-0.0680	0.0199		–

Note: See note to Table 3.13.

Table 3.15 Welfare Participation: Eligible Single Persons

Specification	(1)			(2)			(3)		
Variable	Coefficient	t-value	p-value	Coefficient	t-value	p-value	Coefficient	t-value	p-value
Constant	-0.2532	-0.573	0.57	-0.2247	-0.552	0.58	-1.3433	-6.522	0.00
A2746	2.5298	13.418	0.00	2.1598	12.355	0.00	0.4106	6.556	0.00
A4765	1.8588	12.098	0.00	1.5702	11.495	0.00	0.7133	11.131	0.00
HS	-0.5761	-6.145	0.00	-0.5890	-6.833	0.00	-0.4072	-8.491	0.00
PS	-0.6710	-6.742	0.00	-0.7518	-8.161	0.00	-0.6361	-12.637	0.00
GENDER	0.1481	1.889	0.06	0.1548	2.164	0.03	0.0551	1.386	0.17
QUE	-0.6534	-3.565	0.00	-0.4524	-2.552	0.01	0.8869	12.527	0.00
ONT	-2.5055	-8.546	0.00	-2.0231	-7.351	0.00	0.2114	1.749	0.08
PRAIRIE	-0.8426	-4.014	0.00	-0.9283	-4.693	0.00	-0.2069	-2.048	0.04
BC	0.1742	0.887	0.38	0.1713	0.902	0.37	0.2605	2.817	0.00
W2	-5.7800	-2.660	0.01	-7.6918	-3.448	0.00	-5.7617	-4.060	0.00
TAX	-1.2138	-11.259	0.00	-1.3906	-13.323	0.00	-1.2130	-18.454	0.00
RB	0.5128	2.018	0.04	0.5047	1.829	0.07	-0.1715	-0.919	0.36
UNEMPR	-5.0666	-1.457	0.15	-4.4070	-1.425	0.15	2.3988	1.895	0.06
Constant	2.6102	3.241	0.00	2.4047	2.446	0.01			
A2746	-3.7035	-6.640	0.00	-3.4920	-4.544	0.00			
A4765	-2.6009	-4.747	0.00	-2.2865	-3.017	0.00			
HS	0.0631	0.442	0.66	-0.0642	-0.441	0.66			
PS	-0.1331	-0.942	0.35	-0.2546	-1.901	0.06			
SEX	0.0318	0.307	0.76	0.0540	0.484	0.63			
QUE	2.2110	10.431	0.00	2.5381	12.489	0.00			
ONT	5.1944	10.758	0.00	4.8941	9.668	0.00			
PRAIRIE	1.0901	4.379	0.00	1.2411	4.694	0.00			
BC	0.3966	1.834	0.07	0.5121	2.213	0.03			
RY_6	-23.2100	-8.284	0.00	-29.4770	-15.313	0.00			
PERY	-7.0351	-2.749	0.01	-8.6004	-2.665	0.01			
DEFGDP	-0.1755	-3.658	0.00	-0.2349	-3.815	0.00			
UNEMPR	5.7780	1.699	0.09	5.1549	1.606	0.11			
ρ	-0.6421	-4.899	0.00						

Table 3.16 Extended Results for Welfare Participation: Eligible Single Persons

Specification	(4)			(5)			(6)		
Variable	Coefficient	t-value	p-value	Coefficient	t-value	p-value	Coefficient	t-value	p-value
Constant	0.2908	0.766	0.44	-0.3271	-0.732	0.46	-1.0213	-2.394	0.02
AGE27							2.7046	6.703	0.00
AGE37							2.5430	6.222	0.00
A2746	1.4749	7.429	0.00	2.5736	13.832	0.00			
A4765	2.0319	10.274	0.00	1.9100	12.354	0.00	2.9331	7.402	0.00
HS	0.5151	3.421	0.00	-0.5732	-6.130	0.00	-0.0637	-0.496	0.62
PS	-1.5153	-8.833	0.00				-2.6559	-6.889	0.00
DM				-0.6120	-5.295	0.00			
UNIV				-0.6533	-4.094	0.00			
GENDER	0.4086	4.217	0.00	0.1681	2.127	0.03	0.2555	3.026	0.00
QUE				-0.6623	-3.642	0.00	0.7882	4.554	0.00
ONT				-2.5813	-8.831	0.00	0.2140	0.781	0.44
PRAIRIE				-0.8253	-3.908	0.00	-0.3811	-1.886	0.06
BC				0.1652	0.841	0.40	0.6284	3.220	0.00
W2	-7.2735	-3.112	0.00	-4.7289	-2.107	0.04	-11.6800	-3.440	0.00
TAX	-1.5876	-7.875	0.00	-1.2106	-10.237	0.00	-1.5442	-12.008	0.00
RB	0.9248	2.908	0.00	0.4985	1.928	0.05	0.8440	2.173	0.03
UNEMPR	-15.6170	-6.520	0.00	-4.9800	-1.409	0.16	-4.5509	-1.416	0.16
Constant	-0.1486	-0.275	0.78	2.5914	3.299	0.00	3.8123	3.509	0.00
AGE27							-4.2217	-4.452	0.00
AGE37							-3.5219	-3.680	0.00
A2746	-0.5439	-2.358	0.02	-3.7243	-6.852	0.00			
A4765	-0.7456	-2.838	0.00	-2.6878	-5.037	0.00	-3.8132	-4.017	0.00
HS	-0.9512	-9.675	0.00	0.0401	0.286	0.78	-0.4356	-5.608	0.00
PS	0.6145	2.851	0.00				3.7609	8.254	0.00
DM				-0.0653	-0.472	0.64			
UNIV				-0.9809	-3.663	0.00			
GENDER	-0.2889	-3.213	0.00	0.0487	0.472	0.64	0.0597	0.901	0.37
QUE				2.1654	10.363	0.00	1.1755	7.140	0.00
ONT				5.4883	9.176	0.00	0.6203	2.273	0.02
PRAIRIE				1.0156	4.162	0.00	0.5024	2.272	0.02
BC				0.3184	1.501	0.13	-0.0418	-0.196	0.84
RY_6	-20.9060	-9.674	0.00	-23.7350	-8.381	0.00	-27.9920	-12.441	0.00
PERY	-3.4652	-1.808	0.07	-6.1342	-2.437	0.01	-6.6676	-2.398	0.02
DEFGDP	-0.0038	-0.119	0.91	-0.1830	-3.879	0.00	-0.2006	-3.989	0.00
UNEMPR	18.8490	8.183	0.00	5.3322	1.598	0.11	3.1214	1.152	0.25
ρ	-0.2467	-1.022	0.31	-0.6547	-5.040	0.00	-0.3660	-1.831	0.07

Table 3.17 LR Test: Eligible Single Persons

Specification	LR	d.f.	$\chi^2_{(0.05)}$
1. Lu = (1), Lr = (2)	20.72	1	3.841
2. Lu = (2), Lr = (3)	548.04	14	23.685
3. Lu = (1), Lr = (4)	571.48	8	15.507
4. Lu = (5), Lr = (1)	29.36	2	5.991
5. Lu = (6), Lr = (1)	3.54	2	5.991

Note: Lu is unrestricted log-likelihood and Lr is restricted log-likelihood.

Table 3.18 Welfare Participation: All Single Persons

Specification	(1)			(2)			(3)		
Variable	Coefficient	t-value	p-value	Coefficient	t-value	p-value	Coefficient	t-value	p-value
Constant	-0.9477	-3.464	0.00	-0.0191	-0.037	0.97	-1.4124	-8.003	0.00
A2746	1.4635	13.728	0.00	2.3177	13.319	0.00	0.4959	8.368	0.00
A4765	1.1549	13.614	0.00	1.5578	9.590	0.00	0.7123	11.745	0.00
HS	-0.2500	-3.481	0.00	-0.1671	-1.400	0.16	-0.2454	-5.529	0.00
PS	-0.8113	-11.018	0.00	-0.9419	-7.483	0.00	-0.4418	-8.834	0.00
GENDER	0.4560	8.280	0.00	0.6166	6.152	0.00	0.1751	4.702	0.00
QUE	0.1928	1.684	0.09	-0.7173	-3.337	0.00	0.8476	13.026	0.00
ONT	-0.3896	-2.238	0.03	-1.1963	-3.635	0.00	0.2279	2.045	0.04
PRAIRIE	-0.5025	-3.469	0.00	-0.8431	-3.322	0.00	-0.1268	-1.372	0.17
BC	0.3168	2.293	0.02	0.0648	0.278	0.78	0.2256	2.627	0.01
W2	-8.3846	-12.555	0.00	-5.3979	-5.280	0.00	-6.4418	-9.613	0.00
TAX	-2.1648	-28.824	0.00	-2.2674	-16.565	0.00	-1.5389	-33.680	0.00
RB	0.3031	1.512	0.13	0.4754	1.903	0.06	-0.0668	-0.450	0.65
UNEMPR	-0.9059	-0.467	0.64	-6.0853	-1.826	0.07	2.1315	1.813	0.07
Constant	1.3215	2.160	0.03	1.2582	2.065	0.04			
A2746	-1.3058	-5.138	0.00	-1.5334	-5.037	0.00			
A4765	-0.3453	-1.396	0.16	-0.6381	-2.223	0.03			
HS	-0.2290	-2.362	0.02	-0.2544	-2.425	0.02			
PS	0.1041	0.803	0.42	0.0262	0.198	0.84			
GENDER	-0.1602	-1.625	0.10	-0.2285	-2.214	0.03			
QUE	2.2855	12.727	0.00	2.1202	12.970	0.00			
ONT	1.3114	5.021	0.00	1.5264	5.520	0.00			
PRAIRIE	0.7464	3.320	0.00	0.7155	3.456	0.00			
BC	0.2913	1.530	0.13	0.4788	2.520	0.01			
RY_6	-13.4020	-27.489	0.00	-11.1370	-19.082	0.00			
PERY	-10.0220	-3.799	0.00	-8.9839	-4.342	0.00			
DEFGDP	-0.2181	-3.553	0.00	-0.0990	-2.340	0.02			
UNEMPR	-0.1648	-0.074	0.94	2.8935	1.189	0.23			
ρ	0.96431	24.005	0.00						

Table 3.19 Extended Results for Welfare Participation: All Single Persons

Specification	(4)			(5)			(6)		
Variable	Coefficient	t-value	p-value	Coefficient	t-value	p-value	Coefficient	t-value	p-value
Constant	0.3318	0.853	0.39	0.3242	0.583	0.56	-0.4593	-0.966	0.33
AGE27							2.4100	8.298	0.00
AGE37							2.0544	10.098	0.00
A2746	1.2370	7.822	0.00	1.5625	11.509	0.00			
A4765	1.4676	9.167	0.00	0.9468	6.933	0.00	1.4233	10.051	0.00
HS	0.4280	2.948	0.00	-0.6302	-6.528	0.00	-0.1875	-1.807	0.07
PS	-1.1512	-7.762	0.00				-0.9184	-8.127	0.00
DM				-0.4843	-4.208	0.00			
UNIV				-0.1416	-0.420	0.67			
GENDER	0.6210	6.613	0.00	0.2214	2.888	0.00	0.5295	5.934	0.00
QUE	-6.3021	-5.976	0.00	-0.8567	-2.928	0.00	-0.3657	-1.522	0.13
ONT	-2.1450	-16.751	0.00	-2.1590	-5.290	0.00	-1.1537	-3.721	0.00
PRAIRIE				-0.9536	-3.428	0.00	-0.7723	-3.342	0.00
BC				-0.1444	-0.528	0.60	0.2224	1.032	0.30
W2				-3.2843	-3.328	0.00	-6.5251	-5.838	0.00
TAX				-1.9160	-18.059	0.00	-2.2692	-17.886	0.00
RB	0.1532	0.672	0.50	0.3882	1.788	0.07	0.4983	2.013	0.04
UNEMPR	-12.6490	-5.067	0.00	-2.9506	-0.857	0.39	-3.4797	-1.127	0.26
Constant	-0.4022	-0.725	0.47	0.5887	0.982	0.33	1.3296	2.036	0.04
AGE27							-2.0629	-5.997	0.00
AGE37							-1.2434	-3.760	0.00
A2746	-0.1795	-1.048	0.29	-1.2213	-5.218	0.00			
A4765	-0.1377	-0.717	0.47	-0.0055	-0.027	0.98	-0.6228	-2.037	0.04
HS	-0.7977	-8.074	0.00	0.2930	1.965	0.05	-0.1814	-1.769	0.08
PS	0.4638	2.402	0.02				0.0868	0.644	0.52
DM				-0.2606	-1.861	0.06			
UNIV				-1.5564	-5.658	0.00			
GENDER	-0.3844	-3.847	0.00	0.0358	0.321	0.75	-0.1438	-1.414	0.16
QUE				2.4632	12.122	0.00	2.1076	12.669	0.00
ONT				3.6449	6.435	0.00	1.8273	6.686	0.00
PRAIRIE				0.7640	3.229	0.00	0.8226	3.959	0.00
BC				0.4549	2.053	0.04	0.3479	1.715	0.09
RY_6	-10.2350	-8.905	0.00	-12.3400	-8.225	0.00	-12.6320	-10.341	0.00
PERY	-4.5293	-2.606	0.01	-7.4574	-3.328	0.00	-8.7077	-3.719	0.00
DEFGDP	0.0339	1.018	0.31	-0.0978	-2.005	0.04	-0.1176	-2.291	0.02
UNEMPR	18.4230	8.308	0.00	0.7595	0.268	0.79	1.7158	0.661	0.51
ρ	0.0596	0.274	0.78	-0.0948	-0.521	0.60	0.2451	1.279	0.20

Table 3.20 LR Test: All Single Persons

Specification	LR	d.f.	$\chi^2_{(0.05)}$
1. Lu = (1), Lr = (2)	11.34	1	3.841
2. Lu = (2), Lr = (3)	414.88	14	23.685
3. Lu = (1), Lr = (4)	308.78	8	15.507
4. Lu = (5), Lr = (1)	1.5	2	5.991
5. Lu = (6), Lr = (1)	35.35	2	5.991

Note: Lu is unrestricted log-likelihood and Lr is restricted log-likelihood.

Table 3.21 Welfare Participation: Eligible Single Parents

Specification	(1)			(2)			(3)		
Variable	Coefficient	t-value	p-value	Coefficient	t-value	p-value	Coefficient	t-value	p-value
Constant	3.7197	8.858	0.00	3.7041	8.860	0.00	1.4916	11.904	0.00
A2746	-0.5697	-3.906	0.00	-0.5512	-3.978	0.00	-0.5319	-11.221	0.00
A4765	-0.8456	-4.449	0.00	-0.8420	-4.513	0.00	-0.9420	-15.092	0.00
HS	-0.0232	-0.237	0.81	-0.0150	-0.161	0.87	-0.4605	-14.883	0.00
PS	-0.2667	-2.358	0.02	-0.2500	-2.244	0.02	-0.4894	-12.595	0.00
GENDER	-2.0480	-10.868	0.00	-2.0850	-12.811	0.00	-0.3177	-5.230	0.00
QUE	-0.9212	-5.833	0.00	-0.9197	-5.845	0.00	-0.0788	-1.532	0.13
ONT	-1.4820	-5.430	0.00	-1.4781	-5.456	0.00	-0.0724	-0.832	0.41
PRAIRIE	-0.6456	-3.180	0.00	-0.6255	-3.095	0.00	-0.0062	-0.099	0.92
BC	-0.9031	-4.262	0.00	-0.9083	-4.302	0.00	0.0047	0.074	0.94
TKID05	0.8028	5.031	0.00	0.7902	5.081	0.00	0.2948	6.076	0.00
TKID624	0.7187	5.124	0.00	0.7142	5.201	0.00	0.1913	4.374	0.00
W2	-6.4894	-5.498	0.00	-6.3760	-5.608	0.00	-10.1240	-15.925	0.00
TAX	-1.8981	-14.527	0.00	-1.8789	-14.900	0.00	-1.2986	-34.649	0.00
RB	-0.3827	-1.111	0.27	-0.3703	-1.098	0.27	-0.2402	-2.007	0.04
UNEMPR	-10.8250	-4.299	0.00	-10.8060	-4.298	0.00	1.5113	1.828	0.07
Constant	0.6831	2.496	0.01	0.6913	2.530	0.01			
A2746	-0.4572	-6.393	0.00	-0.4566	-6.359	0.00			
A4765	-0.9417	-9.660	0.00	-0.9269	-9.624	0.00			
HS	-0.6161	-12.169	0.00	-0.6112	-12.124	0.00			
PS	-0.5741	-8.821	0.00	-0.5724	-8.800	0.00			
GENDER	5.8196	0.122	0.90	5.8301	0.130	0.90			
QUE	0.0359	0.401	0.69	0.0421	0.478	0.63			
ONT	0.2004	1.329	0.18	0.2069	1.414	0.16			
PRAIRIE	0.0089	0.088	0.93	0.0062	0.062	0.95			
BC	0.4298	3.524	0.00	0.4341	3.559	0.00			
KID	-0.1607	-4.884	0.00	-0.1649	-5.043	0.00			
KID02	0.1865	3.245	0.00	0.1874	3.267	0.00			
RY_6	-24.2810	-20.983	0.00	-23.9440	-32.367	0.00			
PERY	2.5567	1.935	0.05	2.5128	1.938	0.05			
DEFGDP	0.1402	5.941	0.00	0.1391	5.950	0.00			
UNEMPR	3.8740	2.546	0.01	3.8858	2.577	0.01			
ρ	0.0630	0.397	0.69						

Table 3.22 Extended Results for Welfare Participation: Eligible Single Parents

Specification	(4)			(5)			(6)		
Variable	Coefficient	t-value	p-value	Coefficient	t-value	p-value	Coefficient	t-value	p-value
Constant	1.8842	7.716	0.00	2.8973	9.083	0.00	4.3671	11.473	0.00
AGE27							-0.4857	-3.781	0.00
AGE37							-1.6252	-11.648	0.00
A2746	-0.4893	-3.395	0.00	-0.1789	-1.986	0.05			
A4765	-0.7620	-4.155	0.00	6.6892	0.000	1.00	-1.3461	-6.366	0.00
HS	-0.0060	-0.062	0.95	-0.1956	-2.454	0.01	-0.1119	-1.268	0.20
PS	-0.0470	-0.399	0.69				-0.9948	-10.126	0.00
DM				-0.9185	-12.077	0.00			
UNIV				0.1574	0.569	0.57			
GENDER	-1.8408	-10.371	0.00	-0.2877	-1.625	0.10	0.5496	2.587	0.01
QUE				-0.5198	-3.387	0.00	-1.0652	-7.184	0.00
ONT				-0.9282	-4.348	0.00	-1.7811	-7.363	0.00
PRAIRIE				-1.1384	-6.878	0.00	-0.0983	-0.535	0.59
BC				-0.0013	-0.007	0.99	-0.3517	-1.889	0.06
TKID05	0.9720	7.272	0.00	0.1495	1.899	0.06	-0.4064	-3.283	0.00
TKID624	0.8879	8.086	0.00	-0.0708	-1.008	0.31	-0.2550	-2.453	0.01
W2	-7.4926	-6.548	0.00	-8.5100	-6.948	0.00	-8.5789	-7.683	0.00
TAX	-1.5831	-14.696	0.00	-1.2772	-15.751	0.00	-2.1751	-18.942	0.00
RB	-0.8221	-3.635	0.00	0.0224	0.124	0.90	0.5206	2.029	0.04
UNEMPR	-0.7463	-0.597	0.55	-4.6966	-2.450	0.01	-4.2128	-1.875	0.06
Constant	0.7596	2.998	0.00	-0.2427	-0.557	0.58	-0.1165	-0.418	0.68
AGE27							-0.4808	-7.249	0.00
AGE37							-0.3904	-4.166	0.00
A2746	-0.4716	-5.845	0.00	-0.7580	-7.140	0.00			
A4765	-0.9357	-8.248	0.00	-2.1266	-15.392	0.00	-0.9825	-10.010	0.00
HS	-0.6371	-11.184	0.00	-0.6353	-9.269	0.00	-0.6187	-12.366	0.00
PS	-0.6623	-9.622	0.00				-0.0514	-0.618	0.54
DM				0.2696	2.823	0.00			
UNIV				-1.2503	-8.924	0.00			
GENDER	5.5053	0.137	0.89	-0.3463	-2.600	0.01	-0.7033	-6.208	0.00
QUE				-0.2508	-1.880	0.06	0.0819	0.815	0.42
ONT				-0.3348	-1.597	0.11	0.2579	1.416	0.16
PRAIRIE				0.5136	3.522	0.00	-0.3765	-3.753	0.00
BC				-0.2747	-1.719	0.09	-0.2317	-1.950	0.05
KID	-0.1764	-4.676	0.00	0.1899	5.168	0.00	0.2256	6.802	0.00
KID02	0.1872	3.142	0.00	-0.0957	-1.155	0.25	0.1002	1.546	0.12
RY_6	-24.2230	-20.899	0.00	-25.9530	-20.920	0.00	-22.3820	-22.381	0.00

Table 3.22 (Concluded)

Specification	(4)			(5)			(6)		
Variable	Coefficient	t-value	p-value	Coefficient	t-value	p-value	Coefficient	t-value	p-value
PERY	3.6270	3.274	0.00	10.5570	4.334	0.00	6.7593	5.006	0.00
DEFGDP	0.0639	3.422	0.00	0.1458	4.770	0.00	0.0709	2.826	0.00
UNEMPR	3.1515	2.946	0.00	2.7374	1.551	0.12	0.3220	0.226	0.82
ρ	0.0862	0.524	0.60	0.0260	0.184	0.85	0.3234	2.002	0.05

Table 3.23 LR Test: Eligible Single Parents

Specification	LR	d.f.	$\chi^2_{(0.05)}$
1. Lu = (1), Lr = (2)	0.26	1	3.841
2. Lu = (2), Lr = (3)	389.25	16	26.296
3. Lu = (1), Lr = (4)	98.5	8	15.507
4. Lu = (5), Lr = (1)	44.46	2	5.991
5. Lu = (6), Lr = (1)	202.18	2	5.991

Note: Lu is unrestricted log-likelihood and Lr is restricted log-likelihood.

Table 3.24 Welfare Participation: All Single Parents

Specification	(1)			(2)			(3)		
Variable	Coefficient	t-value	p-value	Coefficient	t-value	p-value	Coefficient	t-value	p-value
Constant	4.0139	12.755	0.00	3.8951	12.524	0.00	1.6351	13.074	0.00
A2746	-0.7322	-6.677	0.00	-0.6037	-5.655	0.00	-0.5520	-11.749	0.00
A4765	-0.5556	-2.733	0.01	0.0834	0.360	0.72	-0.9748	-15.834	0.00
HS	0.0603	0.653	0.51	0.1954	1.860	0.06	-0.4482	-14.645	0.00
PS	-0.7218	-8.982	0.00	-0.8766	-9.661	0.00	-0.4566	-11.855	0.00
GENDER	0.2751	1.446	0.15	0.3512	1.441	0.15	-0.2593	-4.416	0.00
QUE	-0.7120	-5.620	0.00	-0.7033	-5.169	0.00	-0.0432	-0.854	0.39
ONT	-1.0803	-5.681	0.00	-1.1193	-5.654	0.00	-0.0515	-0.603	0.55
PRAIRIE	-0.2270	-1.535	0.12	-0.3215	-2.085	0.04	0.0046	0.075	0.94
BC	0.5850	2.742	0.01	0.3528	1.899	0.06	0.0096	0.155	0.88
TKID05	-0.0548	-0.517	0.60	-0.0216	-0.209	0.83	0.3160	6.650	0.00
TKID624	-0.1483	-1.676	0.09	-0.1439	-1.645	0.10	0.2241	5.258	0.00
W2	-13.8610	-13.179	0.00	-11.9180	-11.775	0.00	-11.1280	-20.005	0.00
TAX	-2.2843	-20.851	0.00	-1.9807	-19.521	0.00	-1.5556	-40.829	0.00
RB	0.1302	0.626	0.53	0.0999	0.495	0.62	-0.2427	-2.077	0.04
UNEMPR	-3.2420	-1.906	0.06	-4.1007	-2.253	0.02	2.1079	2.587	0.01
Constant	0.0361	0.118	0.91	0.1357	0.435	0.66			
A2746	-0.5227	-7.385	0.00	-0.4906	-6.339	0.00			
A4765	-1.2580	-13.614	0.00	-1.4112	-13.858	0.00			
HS	-0.7442	-14.334	0.00	-0.7566	-12.177	0.00			
PS	-0.1303	-1.498	0.13	0.1743	1.560	0.12			
GENDER	-0.5744	-4.794	0.00	-0.5713	-3.673	0.00			
QUE	-0.0535	-0.516	0.61	-0.0019	-0.017	0.99			
ONT	-0.0794	-0.474	0.64	0.0508	0.289	0.77			
PRAIRIE	-0.2909	-2.759	0.01	-0.1790	-1.565	0.12			
BC	-0.3954	-3.286	0.00	-0.3521	-2.823	0.00			
KID	0.2681	7.876	0.00	0.2547	6.848	0.00			
KID02	0.0725	1.071	0.28	0.0229	0.336	0.74			
RY_6	-24.3250	-25.620	0.00	-22.3710	-28.236	0.00			
PERY	5.1412	4.072	0.00	4.4524	3.703	0.00			
DEFGDP	0.0778	2.859	0.00	0.0760	2.950	0.00			
UNEMPR	1.0601	0.690	0.49	1.5639	0.956	0.34			
ρ	0.5655	4.906	0.00						

Table 3.25 Extended Results for Welfare Participation: All Single Parents

Specification	(4)			(5)			(6)		
Variable	Coefficient	t-value	p-value	Coefficient	t-value	p-value	Coefficient	t-value	p-value
Constant	2.3533	9.536	0.00	3.6218	13.026	0.00	4.5321	13.033	0.00
AGE27							-0.4680	-3.907	0.00
AGE37							-1.5087	-11.845	0.00
A2746	-0.6272	-4.406	0.00	-0.5693	-6.358	0.00			
A4765	-0.8003	-4.233	0.00	0.2218	1.047	0.30	-1.1472	-5.545	0.00
HS	0.0401	0.428	0.67	0.1373	1.197	0.23	-0.0508	-0.582	0.56
PS	-0.0098	-0.088	0.93				-0.9129	-9.998	0.00
DM				-0.9668	-10.909	0.00			
UNIV				-0.3155	-1.475	0.14			
GENDER	-1.6694	-9.824	0.00	0.0544	0.283	0.78	0.7248	3.441	0.00
QUE				-0.5899	-4.650	0.00	-0.9611	-7.123	0.00
ONT				-1.0313	-5.692	0.00	-1.6046	-7.388	0.00
PRAIRIE				-0.5060	-3.722	0.00	-0.2190	-1.327	0.18
BC				-0.0534	-0.364	0.72	-0.2672	-1.556	0.12
TKID05	0.9526	7.211	0.00	0.2393	2.159	0.03	-0.3324	-2.828	0.00
TKID624	0.8851	8.160	0.00	0.0517	0.551	0.58	-0.1674	-1.708	0.09
W2	-11.0780	-9.994	0.00	-13.3320	-12.087	0.00	-11.6610	-11.454	0.00
TAX	-2.0450	-17.707	0.00	-2.0232	-20.399	0.00	-2.3822	-20.766	0.00
RB	-0.7175	-3.089	0.00	-0.1081	-0.475	0.64	0.3409	1.422	0.16
UNEMPR	0.3364	0.269	0.79	-3.0981	-1.980	0.05	-3.8366	-1.896	0.06
Constant	0.8487	3.485	0.00	0.1071	0.332	0.74	-0.0806	0.277	0.78
AGE27							-0.4892	-7.097	0.00
AGE37							-0.4031	-4.146	0.00
A2746	-0.4373	-6.033	0.00	-0.5706	-7.597	0.00			
A4765	-0.9813	-9.996	0.00	-1.5860	-17.009	0.00	-1.0700	-10.755	0.00
HS	-0.6528	-12.587	0.00	-0.7948	-13.469	0.00	-0.6583	-12.801	0.00
PS	-0.6676	-10.429	0.00				0.0155	0.172	0.86
DM				0.7639	4.062	0.00			
UNIV				-0.8858	-5.226	0.00			
GENDER	5.6484	0.056	0.96	-0.4675	-3.388	0.00	-0.7695	-6.642	0.00
QUE				-0.1286	-1.302	0.19	0.0769	0.766	0.44
ONT				-0.0670	-0.398	0.69	0.2402	1.341	0.18
PRAIRIE				-0.1030	-0.957	0.34	-0.3285	-3.201	0.00
BC				-0.1866	-1.472	0.14	-0.2581	-2.129	0.03
KID	-0.1468	-4.442	0.00	0.1615	4.809	0.00	0.2540	7.428	0.00
KID02	0.1777	3.111	0.00	-0.0089	-0.131	0.90	0.0893	1.337	0.18
RY_6	-23.9750	-22.112	0.00	-25.2930	-22.783	0.00	-22.7660	-23.393	0.00

Table 3.25 (Concluded)

Specification	(4)			(5)			(6)		
Variable	Coefficient	t-value	p-value	Coefficient	t-value	p-value	Coefficient	t-value	p-value
PERY	2.4109	2.680	0.01	6.0320	4.357	0.00	5.3301	4.564	0.00
DEFGDP	0.0532	2.877	0.00	0.0895	3.210	0.00	0.0515	2.003	0.05
UNEMPR	2.3351	2.324	0.02	1.2369	0.838	0.40	0.5298	0.361	0.72
ρ	0.1589	1.054	0.29	0.4178	2.811	0.00	0.3331	2.258	0.02

Table 3.26 LR Test: All Single Parents

Specification	LR	d.f.	$\chi^2_{(0.05)}$
1. Lu = (1), Lr = (2)	21.58	1	3.841
2. Lu = (2), Lr = (3)	836.46	14	23.685
3. Lu = (1), Lr = (4)	65.06	8	15.507
4. Lu = (5), Lr = (1)	37.8	2	5.991
5. Lu = (6), Lr = (1)	220.74	2	5.991

Note: Lu is unrestricted log-likelihood and Lr is restricted log-likelihood.

Table 3.27 Simulated Effects of Changes in Several Independent Variables[1]

Present system		Single persons[2]			Single parents[3]		
		Prediction			Prediction		
		Not on welfare	On welfare	Total	Not on welfare	On welfare	Total
Actual	Not on welfare	11583	246	11829	8625	1046	9671
	On welfare	740	424	1164	1218	2763	3981
	Total	12323	670	12993	9843	3809	13652
Changes		% increase in predicted number of welfare recipients					
Increase in benefit of 20%		6.12			3.23		
Fall in welfare tax rate of 20%		0			4.80		
Zero welfare tax rate		5.97			29.40		
Increase in unemployment rate of 20%[4]		1.19			-1.92		
Increase in per-capita income of 20%		−10.90			10.84		
Increase in the government deficit to GDP ratio of 100%[5]		−4.48			5.43		

Note: [1] It is assumed that the number of eligible individuals is fixed.
[2] Prediction and simulation are estimated using specification (5).
[3] Prediction and simulation are estimated using specification (6).
[4] The coefficients on the unemployment rate are not statistically significant.
[5] In case of a government surplus, this ratio is reduced to zero.

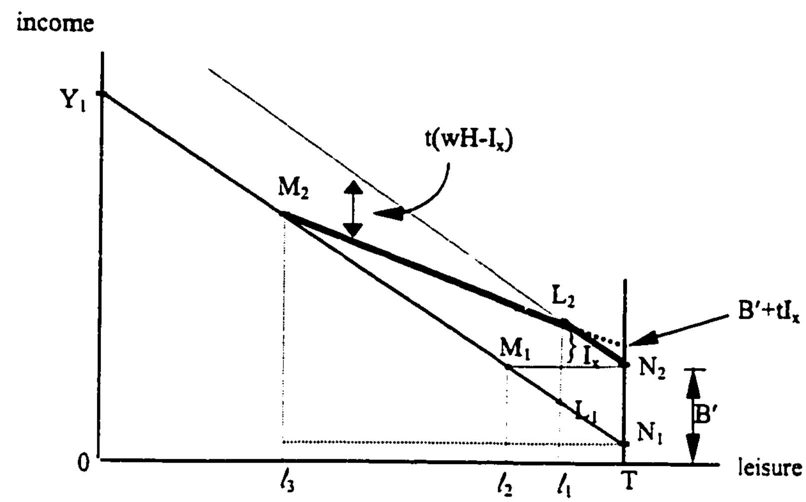

Figure 3.1 Budget Constraint

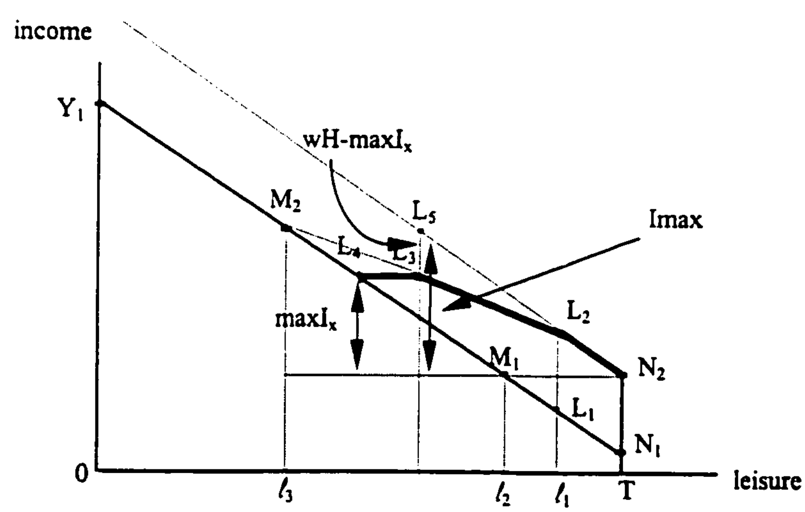

Figure 3.2 Budget Constraint and the Maximum Earnings Exemption

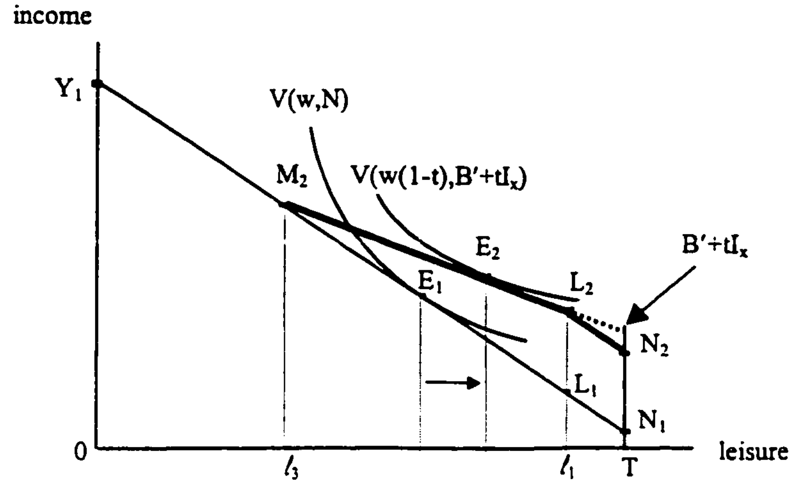

Figure 3.3 Utility Maximization

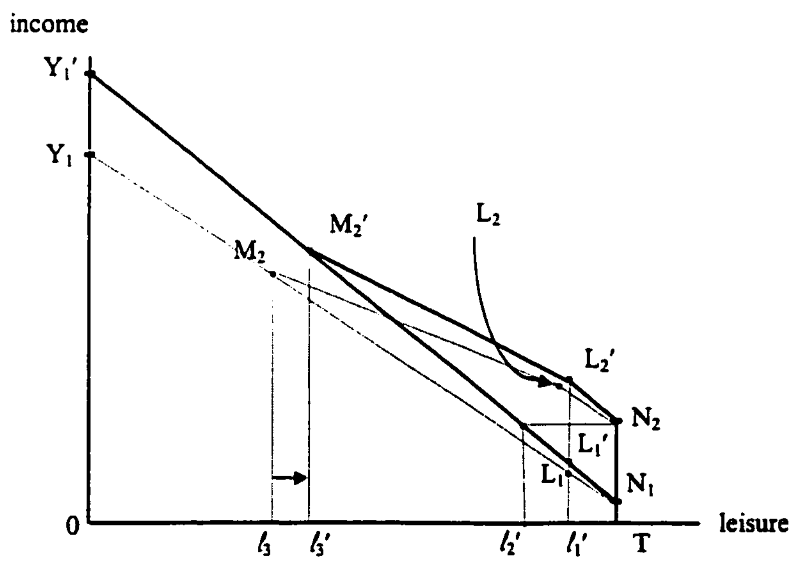

Figure 3.4 Wage Rate Increase

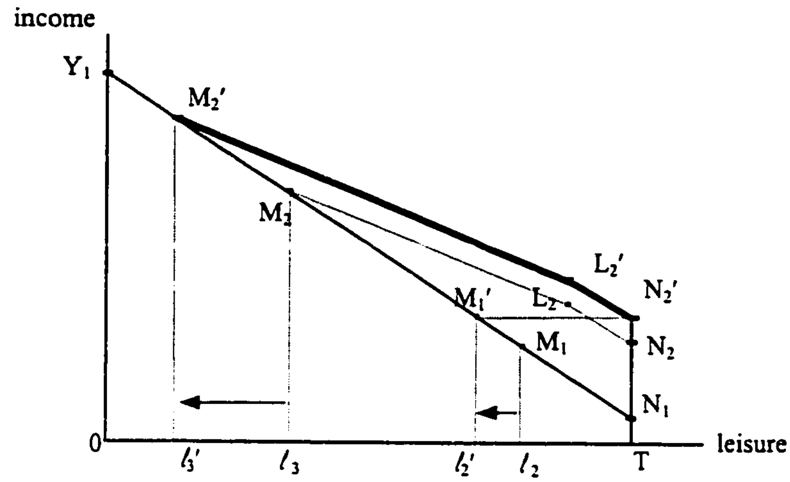

Figure 3.5 Benefit Rate Increase

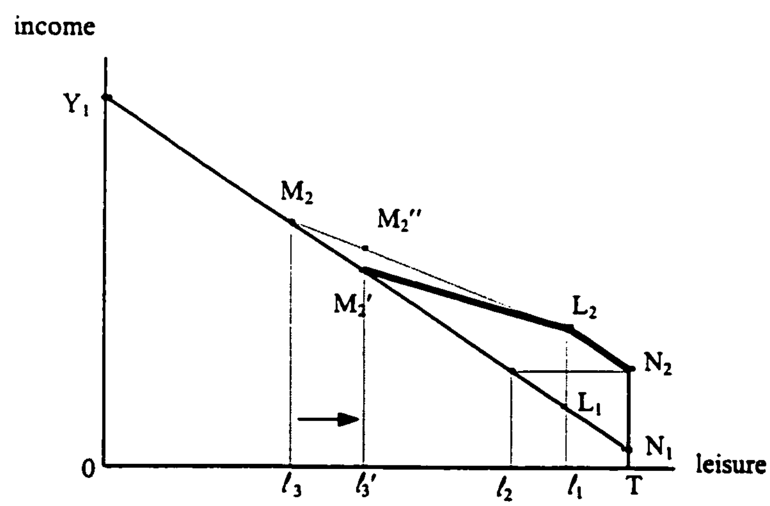

Figure 3.6 Welfare Tax Rate Increase

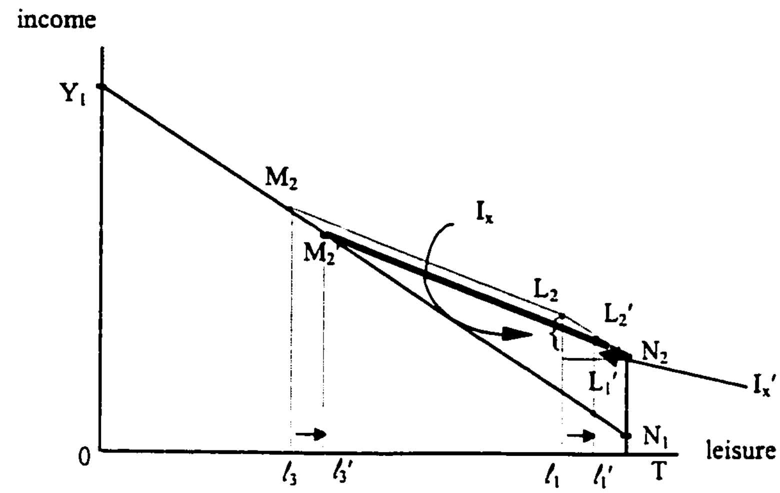

Figure 3.7 Earnings Exemption Reduction

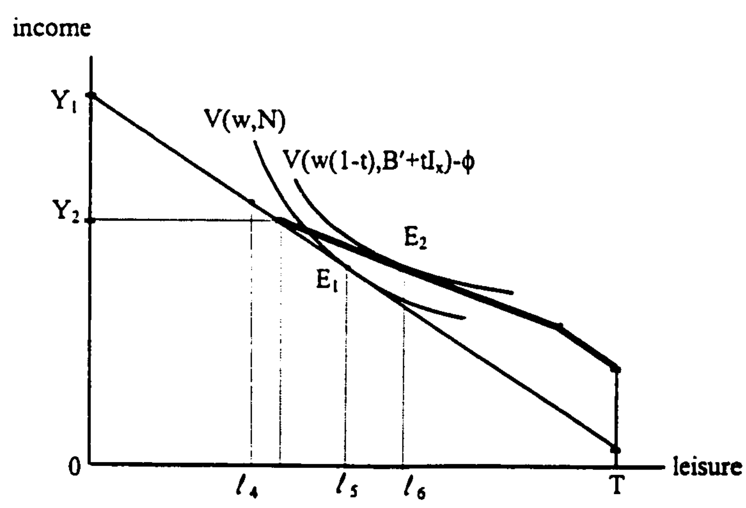

Figure 3.8 Utility Maximum and Potential Income

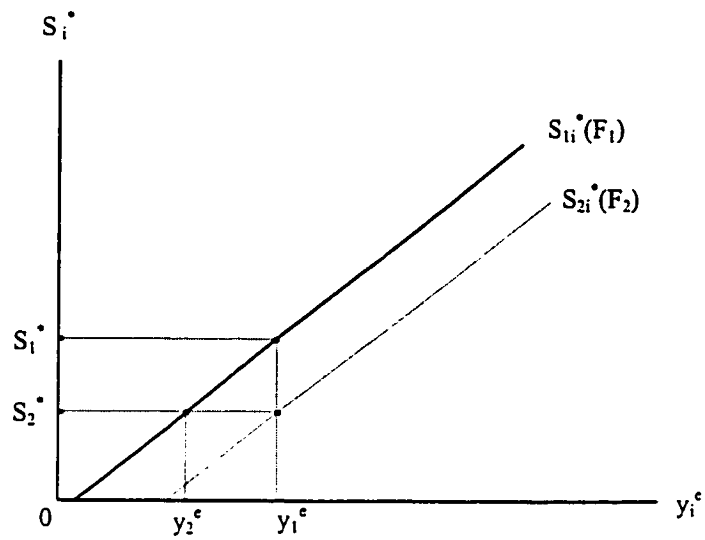

Figure 3.9 Potential Well-Being

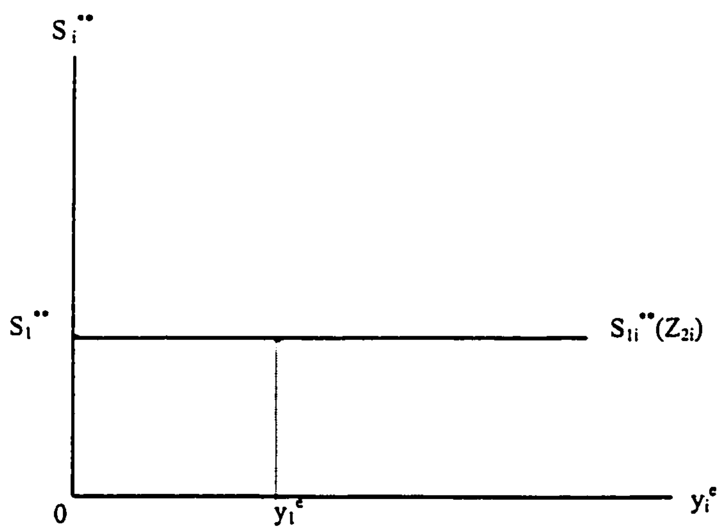

Figure 3.10 Minimum Acceptable Well-Being

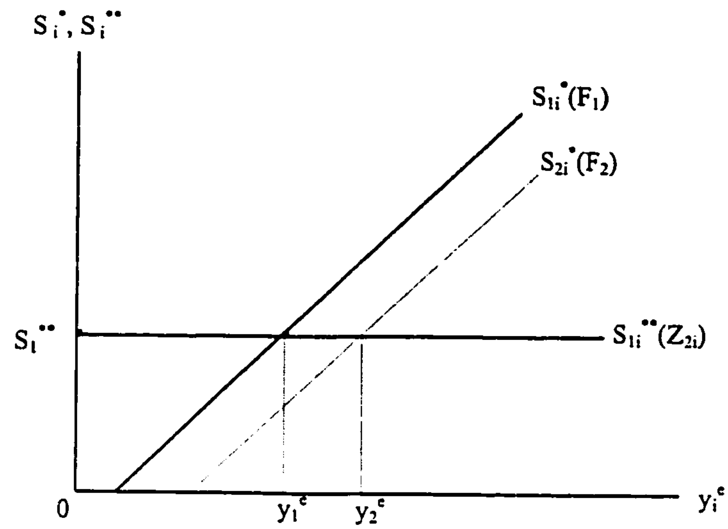

Figure 3.11 Family Status: Potential Well-Being

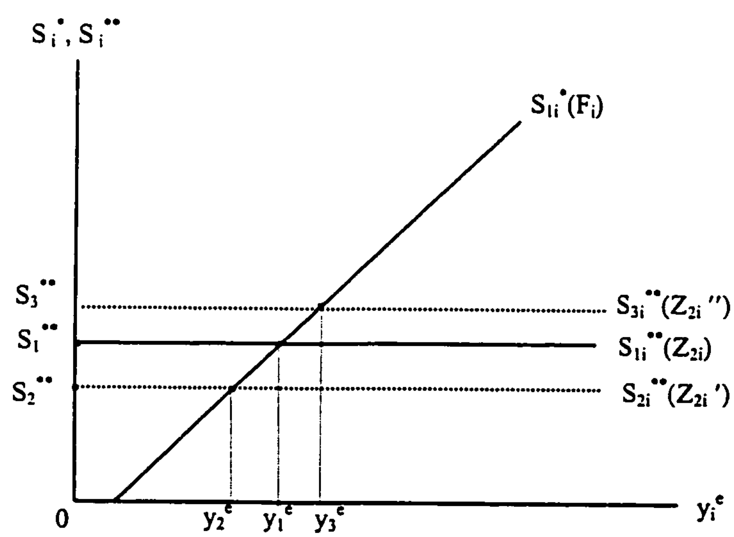

Figure 3.12 Change in Minimum Acceptable Well-Being

CHAPTER 4

THE EFFECT OF ADMINISTRATIVE CHANGES ON WELFARE RECIPIENTS:

The Case of Alberta

4.1 Introduction

In April 1993, the Alberta government launched welfare reforms which were designed to reduce the number of welfare recipients by tightening eligibility requirements and emphasizing the temporary nature of social assistance. Due to the reforms, some welfare recipients were cut off welfare, and some new applicants who were employable received job counseling and were not offered financial assistance. In addition, some welfare recipients who were expected to work were asked to develop an employment plan to improve their job skills and job search activities in order to increase their chances of getting a job and/or leaving welfare. Welfare recipients who failed to do so risked being cut off welfare.

To help welfare recipients achieve their employment plan, the departments of Alberta Family and Social Services (AFSS) and Advanced Education and Career Development (AE&CD) combined their expertise in providing education upgrading, employment preparation, and work experience programs (henceforth, all of these programs are referred to as employment and training (ET) programs) to welfare recipients.

With the ET initiatives, many welfare recipients were affected and government expenditure on ET programs increased. In 1993/94, approximately 11,000 welfare clients were transferred to the Students Finance Board (SFB) for education upgrading and post-secondary education programs. The total number of ET participants in 1993/94 was 17,922[1] while the number of welfare recipients expected to work was 51,962 (Tables 4.1 and 4.2). The number of ET participants increased to 33,203 and 29,170 in 1994/95 and 1995/96, respectively, while the number of welfare recipients expected to work decreased to 41,290 and 37,613 during the same periods. Moreover, the cost of providing ET programs rose from 1.17 percent of welfare expenditure in the 1992/93 fiscal year to 6.66 percent of expenditure in the 1995/96 fiscal year.[2]

After the ET program reforms were initiated, some welfare recipients, who were asked by welfare administrators to develop employment plans which included ET program participation, may not have been able to refuse to participate in ET programs if they still wished to receive benefits. Further, some welfare recipients may not have wanted to participate in ET programs and, thus, may have chosen to exit from welfare. As ET programs were an integral part of the post-1992 administrative changes, it is expected that many individuals who did participate in the programs may have done so

---

[1] Some of them did not receive financial assistance.

[2] Welfare expenditures include expenditures on Supplement to Earnings, Employment and Training Support, Transitional Support, and Assured Support programs. These programs are described in section 4.2.

involuntarily. That is, it is likely that some welfare recipients would not want to have participated in an ET program if participation or non-participation did not affect their welfare benefits. This is because ET program participation consumes time, but might not increase an individual's current or future income.

The first objective of this paper is to determine whether there is evidence to suggest that welfare recipients in 1993-96 were selected by administrators to participate in ET programs. Specifically, this paper examines whether, through "administrative selection," a certain type of welfare recipient was chosen to participate in these programs. For example, welfare recipients who are employable and who have no dependents may be more likely to be selected for ET program participation. It is possible also that administrators may select more welfare recipients for ET program participation if there is a more restrictive government budget, high welfare caseload growth or high economic growth. Unfortunately, the values of these last three variables (the government budget, welfare caseload growth, and economic growth) are common to all welfare recipients at any point in time. Since the analysis below utilises cross-section data, the effect of these variables on different types of welfare recipients cannot be ascertained empirically.

In addition to the issue of ET program participation and selection, other questions also arise with respect to the impact of the 1993 welfare reforms in Alberta. In particular, as a result of these reforms, Alberta's welfare caseload declined from 94,087 (which consisted of 196,000 recipients) to 48,773, or by 48 percent during the period 1993-96. This drastic caseload reduction had never happened before in any other province in Canada. When classified by family composition, the caseload reductions were 62 percent for single persons, 42 percent for single parents, 76 percent for childless couples, and 59 percent for couples with children. However, there is no official evidence showing that those who left welfare entered the workforce.

Alberta's welfare reforms raise two important questions. First, did ET program participation (which may be a consequence of administrative selection) increase welfare non-participation among welfare recipients in 1993-96? Second, did participation in ET programs help welfare recipients enter the workforce and/or enhance their earnings? Providing empirical answers to these two questions is also an objective of this paper. To do this, a model of individual welfare and work decisions must be constructed and estimated since, by simply looking at changes in the number of welfare cases and ET participants, we cannot determine whether ET programs had a statistically significant effect on the number of welfare recipients.

There have been three studies (Boessenkool (1997), Canada West Foundation (1997), and Shillington (1998)) that have focused on the effects of the 1993 Alberta welfare reforms. Boessenkool (1997) showed that there was little support for the hypotheses that individuals who left welfare went to British Columbia, turned to a life of crime, or went on federal employment insurance (EI) benefits. However, he indicated that there was some evidence that former welfare recipients turned to federal and provincial ET programs or went back into the workforce. The results from two separate surveys reported by the Canada West Foundation (1997) and Shillington (1998) supported the conclusion of Boessenkool (1997) that a large proportion of former welfare recipients entered the workforce. In particular, the study by the Canada West Foundation (CWF) showed that about 66 percent of former welfare recipients who were not on welfare at the time of their survey (*i.e.*, during the period February-April 1997) had either a full-time or part-time job. Shillington (1998) used survey data collected by the Population Research Lab (PRL), University of Alberta, during the December 1996-January 1997 period and showed that about 66 percent of the survey sample (those individuals who were on welfare for at least one month during the period 1993-96) were employed permanently or temporarily in 1996.

Moreover, concerning welfare use after the reforms in 1993, Shillington showed that most of the sample had one welfare spell from 1993 to 1996, but there were some welfare recipients who went on and off welfare repeatedly. For example, the number of welfare spells observed in the sample ranged from one to eight. Single parents made up the majority of those who were repeat users.

Even though ET programs were one of the highlights of the Alberta welfare reforms, only Boessenkool (1997) emphasized their role in caseload reduction. In addition, none of these three studies empirically investigated the effect of ET programs on individuals' welfare and work decisions or on their earnings.

In terms of the effect of ET programs on earnings, a review by Friedlander *et al.* (1997) showed that ET programs for AFDC recipients increased earnings by \$438-\$1,849.[3] However, ET programs that were initiated for welfare recipients in British Columbia did not have a positive effect on earnings (B.C. Ministry of Social Services, 1992). A study by the B.C. Ministry of Social Services (1992), using a cell-matching method, showed that some ET programs in B.C. increased Unemployment Insurance (UI) eligibility and encouraged UI dependence, especially during the 12 month eligibility

[3] This review is summarised in Table 2.4.

period following the end of the programs. ET programs reduced welfare use only in the short-term. Moreover, only one ET program (*i.e.*, the Employment Opportunity Program) had a positive long-term effect on the employment of its participants.

In summary, the specific objectives of this paper are to investigate the role of administrative selection in ET program participation and to examine the effect of ET program participation on welfare and work decisions, and on the earnings of welfare recipients in 1993-96. To address these issues, data are required on ET program participation and the employment activity of welfare recipients in each month of the 1993 to 1996 period. To this end, data obtained from a telephone survey conducted by the Population Research Lab (PRL) at the University of Alberta are used.

It should be noted that in this chapter we use the term "the probability of being off welfare" instead of "the probability of welfare participation" because we want to focus on the role of administrative selection in determining the welfare *non*-participation of former, current and future welfare recipients (*i.e.*, individuals who received welfare during at least one month in the 1993-96 period). In this case, welfare administrators may select some *welfare recipients* from the welfare rolls. This is not the same type of administrative selection as the selection (in the previous chapter) of welfare participants from among *eligible individuals*.

The next section of this chapter discusses the welfare programs in Alberta and the reforms in 1993. Section 4.3 describes the data used in the empirical analysis. The data section precedes the theoretical section because it provides necessary background for the theoretical models. Section 4.4 presents the theoretical models and estimation methods. This section is separated into three parts, each of which explains the model and econometric specification required to address each one of the three specified objectives given above. The results are analyzed in section 4.5. The last section contains conclusions.

4.2 Welfare Programs in Alberta

Under the administration of the department of Family and Social Services (AFSS), income support for individuals and families in Alberta, starting in November 1990, consists of four programs: Supports for Independence (SFI), the Alberta Assured Income Plan, the Widows' Pension, and Assured Income for the Severely Handicapped (AISH). Discussions of welfare programs in Alberta generally refer only to the Supports for Independence program, which provides employment and support services to welfare recipients who are employable. The SFI program is designed to provide help that will eventually lead recipients to become self-sufficient and leave welfare.

The SFI program consists of four sub-programs. The first three sub-programs are for clients who are expected to work whereas the last sub-program is for clients who are not expected to work. These sub-programs can be briefly summarized as follows:

a) Employment and Training Support is for clients who are in education or training programs, awaiting or receiving Employment Insurance (EI) benefits, able to work (*e.g.*, single parents with children over 6 months old) and actively seeking employment.

b) Supplement to Earnings is for clients who are employed, but their earnings are insufficient to cover their needs, or who are awaiting their first paycheque. A client in this category is transferred from Employment and Training Support when he/she has earned income.

c) Transitional Support is for clients who are employable but temporarily unavailable for work. This includes a person who has a baby under 6 months old, who is temporarily disabled or has health problems, or who has to care for family members.

d) Assured Support is for clients who are permanently unemployable. Most clients remain in this program for up to 9-10 months, by which time they have either moved to the AISH program, died or begun to receive federal funds. However, clients in the AISH program whose needs exceed the maximum AISH entitlement may receive an additional benefit under this program.

In March 1993, the caseload under the first three sub-programs was 84,925. This caseload decreased by 56 percent, to 37,613, by 1996. The caseload for the *Assured Support* program increased by 22 percent from 9,162 in 1993 to 11,160 in 1996. There is no clear explanation for the high caseload increase in the *Assured Support* program.

4.2.1 The Reforms in 1993

The main aim of the welfare reforms in 1993 was to promote training, employment and self-sufficiency (AFSS, 1993/94). To achieve this goal, the AFSS implemented the following: employment initiatives, fraud investigation and eligibility review, and benefit adjustments. Welfare recipients who were most affected by these changes were those who were expected to work (*e.g.*, young and single employable individuals (Boessenkool, 1997)).

i) Employment Initiatives

Employment initiatives directly affected clients in the *Employment and Training Support* and *Supplement to Earnings* programs. Table 4.2 shows the number of clients that participated in these employment initiatives in 1993-96. Welfare recipients who participated in these programs tended to be removed from the welfare system or leave welfare voluntarily when they completed the programs. During the period 1993-96, the proportion of participants in the employment initiative programs that did not receive welfare benefits 12 months after leaving the programs was about 70 percent each year (AFSS, 1996/97). However, there are no data indicating how many of those who left ET programs and welfare came back onto welfare at some time during the 1993-96 period.

Three main programs constitute the employment initiatives (AFSS, 1996):

a) Work Experience Programs are designed to help welfare recipients return to the workforce. The Work Experience Programs are six months in duration and participants in these programs are paid wages which are funded by the AFSS. Earnings from these programs are subject to deductions for Employment Insurance premiums, Canada Pension Plan payments and the welfare clawback. The welfare reforms in 1993 introduced three work experience sub-programs.

- *Alberta Community Employment (ACE):* This program enables welfare clients to develop skills by cost-sharing wages with municipalities, non-profit organizations, hospitals, health units and schools. This program provides a wage rate of $5 per hour and a benefit rate of $1 per hour to a participant. From 1993 to 1995, 73 percent of clients in this program did not receive welfare one year after completing the program, and an additional 6 percent were employed and received *Supplement to Earnings* (AFSS, 1996).

- *Employment Skills Program (ESP):* Under this program, temporary employment is provided by provincial government departments and publicly funded organizations. Participants are paid $6 per hour and may receive up to $1,000 for individualized training. From 1993 to 1995, about 73 percent of clients in this program did not receive welfare one year after completing the program, and an additional 10 percent were employed and received *Supplement to Earnings* (AFSS, 1996).
- *Alberta Job Corps (AJC):* This program is designed for long-term welfare recipients who are unemployed. Under this program, clients participate in the program through working in shop or community projects, and are paid $5 per hour. From 1993 to 1995, about 85 percent of clients in this program were not on welfare one year after completing the program, and an additional 5 percent were employed and received *Supplement to Earnings* (AFSS, 1996).

b) Employment Preparation Programs administered by the AE&CD and co-funded by the AFSS. Unlike the Work Experience Programs, participants in these programs do not receive wages. These programs include Training on the Job, the Employment Alternatives Program, Job Placement, and Integrated Training. Training on the Job offers work experience and skills training. The Employment Alternatives Program offers job-specific skills training, life management skills, academic upgrading, supplemental work experience and career counseling. Job Placement is for clients who are job ready, and directs clients into a placement agency to prepare for employment.

Integrated Training offers services to improve client's self-esteem, provides hands-on skills training, and assists with job searches.

c) Education and Training Programs: Before the reforms, a number of recipients received welfare benefits while they attended school. After the reforms, welfare recipients who were students were transferred to the Students Finance Board (SFB) and they received funding from the SFB in terms of a loan or grant rather than a welfare benefit. Students who enroll in literacy training, ESL programs and high school upgrading are in the *Basic Foundation Skills* program while students who attend technical institutions, colleges and universities are in the *Skill Training* program. Through an administrative agreement, the AFSS shifts funds to the SFB to be issued as grants for students in the *Basic Foundation Skills* program and as loans for students in the *Skill Training* program.

ii) Fraud Investigation and Eligibility Review

The AFSS performed follow-up checks of new clients to verify eligibility, randomly checked files of current clients and conducted home visits to confirm both clients' eligibility and the appropriate level of benefits. By doing so, the AFSS saved about $15 million from 1993 to 1996 (Table 4.3). Approximately 17-22 percent of cases reviewed were closed during that period. Moreover, the Fraud Investigation units identified about $6.6 million in 1994/95 and $6.8 million in 1995/96 that were paid to welfare recipients due to error or fraud (AFSS, 1994/95 and 1995/96).

iii) Benefit Adjustments

Shelter benefits for those expected to work were reduced. The Standard Allowance for all adults was reduced by $26 per month. In addition, Supplementary

Benefits were significantly changed (Table 4.4).

These reforms caused the SFI to be viewed more as a program of last resort. The AFSS tried to divert clients away from welfare or to direct them to alternate programs. Specifically, when an employable person applies for welfare, they may receive job counseling or be directed to the AFSS and AE&CD services or programs that will assist them in finding employment,[4] and they may not receive financial assistance. A new welfare client is usually put in the *Employment and Training Support* program if he/she is employable. All clients in this category are required to develop an employment plan and may be advised to participate in one of the ET programs.[5] Once a client finds employment or begins a work experience program, he/she may leave welfare or may be moved to the *Supplement to Earnings* category. In this program, benefits are calculated according to need, but earned income either from employment or from one of the work experience programs, less $115 (the earnings exemption), is clawed back at a rate of 75 percent.[6]

Clients in the *Transitional Support* program were also affected by the reforms. Before 1993, welfare recipients were eligible to be in the *Transitional Support* program if they had a child or children under 2 years old. Since 1993, welfare recipients may be in the *Transitional Support* program if their child is under 6 months of age or if they have

---

[4] The services provided by the AFSS and AE&CD are job information, employment referrals, employment planning, orientation workshops, a career information hotline, and labour market information centres.

[5] Some clients may choose to leave welfare if they do not want to participate in an ET program.

[6] Before the reforms, the clawback rates (or welfare tax rates) were 0, 50, 75, and 90 percent for earnings below $116, between $116-$200, $201-$300, and over $300, respectively.

some temporary condition that prevents them from working. Once the situation has changed, *e.g.*, the child becomes older than 6 months or the temporary condition has improved, clients in the *Transitional Support* program are moved to the *Employment and Training Support* program or removed from the welfare roll.

4.2.2 Summary

From the AFSS data, it is quite obvious that the Alberta welfare reforms succeeded in transferring clients to ET programs, and in reducing welfare caseloads and government expenditures on welfare programs. The number of clients who were expected to work and who were receiving benefits per 1,000 working age population, which was 33 in 1993/94, fell to 16 in 1996/97 (AFSS, 1996/97). According to Tables 4.1 and 4.2, the caseload of those expected to work fell by 39 percent from 1993 to 1994, by 21 percent from 1994 to 1995, and by 9 percent from 1995 to 1996. In the same three years, SFI expenditures fell by 11 percent, 34 percent and 7 percent, respectively, while AFSS expenditure on employment and training initiatives increased by 161 percent, 2 percent and 16 percent, respectively.

4.3 The Data

To understand the theoretical models included in the next section, it is necessary to understand the characteristics of the data to be used in the empirical analysis. Since the available data will have a large impact on the form of the model to be estimated, the data are described before proceeding to the theoretical models.

The data were obtained from a survey conducted by the Population Research Laboratory (PRL) at the University of Alberta. The two main social assistance programs included in the survey were the Supports for Independence (SFI), and assistance from the Students Finance Board (SFB). Individuals covered by the Assured Income for the Severely Handicapped (AISH) program were not included since they were not affected by the 1993 welfare reforms.

The survey by the PRL was aimed at examining the effect of the Alberta welfare reforms on welfare recipients in 1993-96. About 500 former and current welfare recipients in Alberta were interviewed by telephone during the period December 1996 to January 1997. Samples were drawn by the random-digit-dialing method.[7] All respondents in the survey had received welfare benefits (either social assistance or support for academic upgrading) for at least one month in the four-year period January 1993 to December 1996. The respondents were asked about their family background, welfare and work experiences, and employment and training experiences during the four-year period.

The benefit of using this survey is that it contains data on both labour market and ET activities. The labour market activities include the earnings and periods of employment for up to 3 jobs during the period 1993-96. The ET activities include details concerning the particular ET program in which an individual participated and periods of ET program participation. In addition, the survey data include the reasons why individuals were on welfare, information which is not included in other surveys (such as the Labour Market Activity Survey or the Survey of Labour and Income Dynamics). Inclusion of these reasons among the explanatory factors in the welfare-work decision

[7] For details of the survey method see Shillington (1998), pp. 17-20.

model may reduce the size of the unobserved factors that affect an individual's behaviour and may, therefore, yield a better explanation of work and welfare decisions.

One shortcoming of this data set is that it may involve recall error concerning monthly hours of work and the value of monthly welfare receipts since each respondent was questioned about events during the four previous years. However, these factors are not used in the estimation below. In addition, Shillington (1998) showed that unattached individuals were significantly under-represented in the sample relative to the population of welfare recipients. If unattached individuals did not live with their parents, lived in a place where there was no telephone, or moved many times during the survey period, it might be difficult to locate and interview such individuals by telephone. However, Shillington showed that the sample appeared to be representative of AFSS administrative data on all welfare recipients in terms of the gender and age of welfare recipients.

4.3.1 Sample Description

Shillington (1998) described the characteristics of the data from the PRL survey. He showed that about 27 percent of respondents (Table 4.5) who were on welfare in 1993 were younger than 25, compared to 25 percent in the administrative data. For the PRL survey, about 13 percent of the sample were older than 44, while this proportion was 19 percent in the administrative data. About 69 percent of the survey's welfare recipients in 1993-96 were women, compared to 62 and 64 percent in the administrative data in 1993 and 1996, respectively. Moreover, Shillington found that 24 and 22 percent of the survey's welfare recipients in 1993 and 1996 were single persons, compared to 43 and 45 percent of welfare recipients in the administrative data. As mentioned earlier, single persons are under-represented in the PRL survey while other family types are over-represented, especially couples with children. This may be due to the fact that, for a couple with children, one of the parents may have been more likely to be at home and available for a telephone interview.

The data from the PRL survey showed that a large proportion of respondents reported only one spell on social assistance during the four-year period. However, there also appear to be a considerable number of welfare recipients who were repeat users. Shillington (1998) indicated that about 45 percent of the total sample received benefits at some point in 1993, and about 69 percent of these also received benefits in the following year. In addition, about 55 percent of the total sample received benefits in 1995, and about 72 percent of these also received benefits in 1996.

Shillington (1998) found that most respondents were on social assistance for only a small portion of the four-year period, and that single parents tended to have longer welfare spells than other family types. The median duration of welfare spells was about 3 months. This median welfare duration seems to be shorter than that observed in British Columbia and Quebec. Barrett and Cragg (1998) showed that, during the period 1980 to 1992, more than 50 percent of welfare spells in British Columbia ended within 3 months and only 10 percent of welfare spells lasted longer than a year. Fortin and Lacroix (1997) showed that, in 1979-93, median welfare durations for males and females by age group in Quebec ranged from 11 to 36 months.

Concerning the employment of welfare recipients, Shillington showed that only 28 percent of the total sample were employed in 1993, compared to 66 percent in 1996. However, Shillington found that 45 and 61 percent of the sample were on welfare in 1993 and 1996, respectively. The increase in both employment and welfare participation in 1996 could be a result of respondents' recall error for the year 1993 (Shillington, 1998).

With respect to job characteristics, Shillington showed that 25 percent of all jobs held by respondents had lasted for 13 weeks or less, 50 percent had lasted from 14 weeks to 64 weeks and 25 percent had lasted more than 64 weeks. Most jobs were of the low-skill and low-pay type. More than half of all jobs paid less than $1,000 per month, before taxes and deductions.

4.3.2 Sample Set

The empirical analysis to be explained in section 4.4 below will be separated into three parts that use two different sample sets. Therefore, the sample sets to be used are discussed in two sub-sections. The first sub-section will discuss the cross-section data set used to estimate the models (developed in sections 4.4.1 and 4.4.3 below) that describe ET program participation and current earnings. The second sub-section will discuss the pooled cross-section time-series data set that are employed to estimate the welfare-work decision model (described section 4.4.2).

i) Cross-Section Data

Cross-section data are used to study administrative selection and ET program participation as well as the effect of ET programs on current earnings. Each observation represents an individual as of December 1996 who received welfare for at least one month during the period 1993-96.

Observations from the survey data (a total of 497 persons) were deleted if the respondent was not a former or current welfare recipient, or was not the spouse of a former or current welfare recipient. This is because the information provided in such cases is incomplete and may be associated with much larger recall errors. Observations were also deleted if the respondent was older than 65 or permanently disabled. These persons were unemployable, and it is less likely that they were affected by the welfare reforms.

After these deletions, 408 individuals remained in the sample. As indicated in Table 4.6, which provides descriptive statistics for this sample set, about 55 percent of the sample are in the 25-39 age group and about 70 percent of the sample are female. The average age of individuals in the sample is 34. Approximately 22 percent of the sample are single, and about 31 percent of the sample have no children. The average number of children is 1.4. Close to 42 percent of the sample have high school education or less, and about 30 percent have some post-secondary education or a diploma.

The most common reason for an individual in the sample to have been on welfare was unemployment (28 percent). Approximately 17 percent of the sample were on welfare because they had insufficient income, while another 9 percent were on welfare because their partner had left. Moreover, about 11 percent of the sample were on welfare because they had a health problem.

Since welfare recipients reported their earnings in earnings ranges,[8] we will use the mid-point of each earnings range to represent their monthly earnings when we estimate the earnings equation. Therefore, individuals' monthly earnings from a job in

[8] Because respondents reported earnings in ranges, this information is likely to be more accurate than the reported hours of work for which they reported the exact number of hours. When we add up total hours of work from the 3 jobs reported, some respondents had total hours of work in a week in excess of 168.

each earnings range are specified as \$250, \$625, \$875, \$1,250, \$1,750, \$2,250 and \$2,750. The mid-point of the highest earnings range is assumed to be \$3,250.[9] The data in this sample show that about 55 percent of the sample had no current earnings and an additional 35 percent had current earnings below \$1,500 per month.

From Table 4.7, 50 percent (57 of 114) of welfare recipients who were on welfare because they were unemployed had no earnings in December 1996 (they may or may not have been on welfare at that time), and 88 percent (100 of 114) earned less than \$1,500 per month. Most of the welfare recipients who had a health problem (84 percent), or who had been left by their partner (60 percent) at the time of their welfare participation, had no earnings in December 1996.

About 54 percent of the sample participated in ET programs at some point during the period 1993-96. Table 4.8 shows that 60 persons of the total of 408 persons participated in ET programs in December 1996. Among this group, about 77 percent (46 of 60) had no current earnings, and about 59 percent (17 of 46) of these had participated in an ET program before December 1996. Among persons who did not participate in ET programs in December 1996, but who had completed an ET program or left an ET program before December 1996, about 47 percent (75 of 161) had no earnings in December 1996, and about 24 percent (38 of 161) earned at least \$1,000 per month. Among those who had never participated in any ET program, more than half had no

[9] This assumption is arbitrary. However, it may not affect the results because only 1.72 percent of the sample earned more than \$3,000 in December 1996 (Table 4.6).

earnings in December 1996, and about 18 percent (33 of 187) earned at least $1,000 per month.

Finally, Table 4.9 shows that the number of months of ET program participation may not necessarily increase monthly earnings. About 55, 62, 46 and 53 percent of individuals who had participated in ET programs for 0, 1-6, 7-12 and more than 12 months, respectively, had no earnings. On the other hand, about 17, 18, 25 and 20 percent, respectively, earned at least $1,000 per month.

ii) Pooled Cross-Section Time-Series Data

The data from the same survey are transformed into a pooled cross-section time-series data set to study the effect of ET programs on the welfare and work decisions of welfare recipients. Monthly data are required because welfare administrators review each welfare case every month, and welfare recipients make a work-welfare decision more frequently than once a year. During a year, the factors that affect work and welfare decisions can change, and a welfare recipient can go on and off welfare, or in and out of the labour market many times.

From the cross-section data described in the previous sub-section, individuals who did not report complete information about monthly welfare status, related labour market activities and monthly ET program participation were deleted. This left 332 former and present welfare recipients (in December 1996) in the sample. For each person in the sample, the data set contains 48 months of work, welfare, and ET activities. Each month of these activities is treated separately, as though it represents a single observation for a different person. In this way, data on 332 individuals were transformed into 15,936 individual monthly observations.[10]

Table 4.10 provides descriptive statistics for this sample set. Approximately 74 percent of the sample is 20 to 39 years old, and 72 percent of the sample is female. Compared with administrative data (Table 4.5), single persons in this data set are still under-represented and couples with children are still over-represented. About 64 percent of the sample have high school education or less. Half of the sample have 1 or 2 children. About 86 percent of the sample held up to 3 jobs during the 1993 to 1996 period, where job number one was the most recent job.[11] Earnings from each job are not comparable since they can be of different types (*e.g.*, full-time jobs or part-time jobs, high-skill jobs or low-skill jobs) covering different periods of time. However, most jobs paid less than $1,500 per month.

Table 4.11 shows the extent of participation in the labour market, welfare and ET programs. About 31 percent (5,003 of 15,936) of all monthly observations for all individuals[12] in the sample were associated with welfare benefit receipt during the four-year period. The average welfare benefit was $777 per month.[13] About 25 percent (1,263 of 5,003) of individuals who were on welfare worked concurrently. About 13 percent

---

[10] This transformation could lead to the correlation of the error terms. This is a cost of using the monthly data on each individual. However, as noted above, the use of annual data also has problems.

[11] The survey contains data on the employment period for up to 3 jobs. In the empirical analysis, we estimate the welfare and work equations (section 4.4.2) using the full sample (15,936 observations) as well as a sample that excludes persons with more than 3 jobs (13,680 observations).

[12] An individual in this sample set refers to a monthly observation of a former, current or future welfare recipient.

[13] This is the average over the 4,685 observations that reported benefit receipt.

(1,997 of 15,936) of the sample participated in ET programs. About 42 percent (829 of 1,997) of these received welfare while participating in ET programs. In addition, about 34 percent (901 of 2,661) of individuals who had completed or left ET programs received welfare. According to Table 4.12, welfare participation does not decrease as the number of months of ET program participation increases. About 34 percent of individuals who had participated in ET programs for 7-12 months received welfare. This proportion is slightly higher for those who had participated in ET programs for more than a year.

Comparing work participation for those who participated in ET programs and those who did not, Table 4.11 shows that about 28 percent (566 of 1,997) of individuals who participated in ET programs worked at the same time, while about 36 percent (4,990 of 13,939) of individuals who did not participate in ET programs worked. For those who completed or left ET programs, about 54 percent (1,448 of 2,661) worked. For those who had not participated in an ET program, only 31 percent (4,108 of 13,275) worked. Moreover, Table 4.12 shows that the proportion of individuals that worked increased with the number of months of ET program participation, except for ET program participation that exceeded one year.

4.4 Theoretical Model and Estimation Method

As shown in section 4.2, after the 1993 welfare reforms, both government expenditure on welfare programs and the number of welfare recipients declined substantially. However, there is no empirical evidence to show whether the reforms helped welfare recipients to become self-sufficient or to enter (and remain in) the workforce. In order to provide such evidence, it is necessary to construct a model that explains the welfare and work decisions of welfare recipients, and to use the survey data described above to examine welfare and work decisions empirically. Such a model will show how the reforms (*i.e.*, employment initiatives and benefit reduction) and changes in other factors affected welfare recipients' earnings, as well as their decisions to work or remain on welfare. Since the reforms may involve administrative selection, we also take this selection into account in our analysis.

The theoretical model is separated into three parts. The first part models how welfare administrators may select welfare recipients to participate in ET programs. This part assumes that welfare administrators decide, from among welfare recipients, who should participate in ET programs. The second part of the analysis explains how ET program participation may affect a welfare recipient's probabilities of being off welfare and of working. In this part, the decision makers are the welfare recipients. They decide whether or not they should work and whether they should be on or off welfare during each month. The last part of the analysis models the effect of ET programs on the current earnings of welfare recipients. This part also considers how to correct the estimation for the selection bias that may occur if ET program participation is determined by welfare administrators. The estimation methods for each of these three parts are explained separately since they each involve a different econometric specification.

It is important to note that the model developed here pertains only to former or current welfare recipients. This is because the available data include only these types of individuals and because administrative changes, such as employment initiatives, directly affect only welfare recipients. In addition, welfare administrators tend to choose the participants of ET programs from among welfare recipients, not from among all eligible individuals.

4.4.1 Administrative Selection and ET program participation

In this section we construct a model to explain how welfare administrators may select some welfare recipients to participate in ET programs. The model is based on the assumption that welfare administrators decide who should participation in ET programs in order to maximize the net present value of the social benefit of ET program and social assistance (SA) participation.

Since the 1993 welfare reforms, welfare administrators have had two options in granting assistance to potential welfare recipients. First, they may grant welfare benefits without requiring welfare recipients to participate in ET programs. Second, they may select welfare recipients for an employment and training program and may or may not provide them with welfare benefits. It is hypothesized that welfare administrators choose the option that maximizes society's net benefit.

Let the net present value of the social benefit of the welfare program (NSB_i^*) be the difference between the net present value of the social benefit of providing the ET program (NSB_{ETi}), with or without the welfare benefit, and the net present value of the social benefit of providing only the welfare benefit (NSB_{SAi}) to individual *i*. Welfare administrators are assumed to select individual *i* to participate in the ET program if his/her NSB_{ETi} is greater than NSB_{SAi}, that is, if $NSB_i^* > 0$. Otherwise, this individual is not selected to participate in the ET program.

Welfare administrators are assumed to evaluate NSB_i^* by taking into account pecuniary and non-pecuniary (or intangible) costs and benefits, distributional weights, and a discount factor. By providing welfare and/or ET to low-income individuals, some people in society gain but others may lose. Welfare administrators use distributional weights in summarizing the gains and losses of each option (ET and SA), and may also discount future net social benefits.[14]

When welfare administrators provide welfare to individual *i* without requiring him/her to participate in ET programs, they evaluate NSB_{SAi} for individual *i* using the flow of pecuniary welfare costs and benefits, which includes welfare payments and operating costs, as well as the non-pecuniary costs and benefits. Regarding the pecuniary cost and benefit of welfare, welfare payments are a cost to taxpayers, but a benefit to welfare recipients. When considering the non-pecuniary benefit, the net cost incurred by taxpayers may be lower if taxpayers obtain higher utility from helping the poor. Additionally, the net benefit that is obtained by welfare recipients could be lower if they feel uncomfortable receiving welfare (*i.e.*, stigma effect). Given the distributional weights and discount factor, welfare administrators evaluate NSB_{SAi} for each individual.

When welfare administrators provide an ET program to individual *i*, taxpayers also bear the program cost. The ET program is expected to benefit its participants by raising their expected earnings. This pecuniary benefit may be lower if ET program participants have to pay taxes or have their welfare benefits clawed back. There may also

[14] One may argue that administrative selection for ET program participation could also be explained by bureaucratic behaviour or game theory.

be intangible costs or benefits from ET program participation. ET program participants will have a utility gain if they enjoy ET program participation or if they derive satisfaction from a higher stock of human capital. However, they may also suffer a utility loss since ET program participation requires participants to sacrifice their leisure time, but ET program participation may not increase their current earnings. Taxpayers may gain if they expect that ET program participants are more likely to become self-sufficient (which reduces future welfare costs). However, taxpayers may suffer a negative externality if welfare administrators place parents with small children in an ET program (*e.g.*, taxpayers may prefer that one parent remain with their small children). Given the distributional weights and the discount factor, welfare administrators evaluate NSB_{ETi} for each individual.

The net present value of the social benefit of providing welfare and/or the ET program to a person can vary with the subjective distributional weights (*i.e.*, the value of a dollar gained or lost by program participants and taxpayers) and how long the benefits of ET programs last (*i.e.*, how long the earnings increase lasts for ET program participants). With a larger distributional weight for welfare participants than for taxpayers, both NSB_{SAi} and NSB_{ETi} could increase. With a longer period of higher benefits from ET programs, NSB_{ETi} could be higher.

i) The Net Present Value of the Social Benefit (NSB_i^*)

As explained earlier, the net present value of the social benefit of providing welfare and/or an ET program is evaluated by welfare administrators and is determined as:

(4.1) $NSB_i^* = NSB_{ETi} - NSB_{SAi}$.

An individual is selected to participate in an ET program only if $NSB_i^* > 0$, and is not selected otherwise.

However, NSB_{ETi} and NSB_{SAi} depend on many unobserved factors such as expected earnings, the non-pecuniary cost and benefit of welfare or ET program participation, how long any earnings increase will last, and the distributional weight. Since these factors are unobserved, welfare administrators must evaluate NSB_{ETi} and NSB_{SAi} based on the individual and household characteristics that affect these factors. As a result, the unobserved factors are omitted from the equation determining NSB_i^* and the observed individual and household characteristics are included among the determinants of NSB_i^*. Letting the individual and household characteristics which welfare administrators use to evaluate NSB_i^* be represented by the vector X_{1i}, the equation describing NSB_i^* is:

(4.2) $NSB_i^* = f_1(X_{1i})$.

As before, individual *i* will be selected to participate in the ET program if $NSB_i^* > 0$, and will not be selected otherwise.

ii) Predictions

Given the data available in the PRL survey, the individual and household characteristics included in the vector X_{1i} are age, gender, the level of education, family status, the number of children, and the main reasons for welfare participation (Table 4.13).

It is expected that a younger individual may have either a higher or lower NSB_i^* than an older individual. Young individuals may have a high NSB_{ETi} if they are able to learn faster which reduces the cost of ET programs. They may also have better job opportunities and be able to earn more in the future and for a longer period of time. However, if older age is associated with more work experience, it will increase job opportunities and reduce the period of ET participation. In this case, NSB_{ETi} may be higher for an older individual. Therefore, the effect of age on NSB_{ETi} can be either positive or negative. The NSB_{SAi} for young individuals may be low even though they may have lower welfare stigma (which increases NSB_{SAi}). This is because taxpayers may not want to support young individuals who are employable, and may not want them to become dependent on welfare. The effect of age on NSB_{SAi} is expected to be positive. However, given the ambiguous effect on NSB_{ETi}, the net effect of age on NSB_i^* is ambiguous.

The effect of gender on NSB_i^* is also ambiguous. Males may have better job opportunities than females due to gender discrimination and may, therefore, have a higher NSB_{ETi} since their expected earnings are higher. However, males can be either less or more concerned about society's view and, thus, can have either lower or higher stigma. Since this effect contributes to the non-pecuniary cost of being on welfare, and to NSB_{SAi}, the NSB_i^* of males could be either lower or higher than that of females.

A higher level of education should have a positive effect on NSB_i^*. The pecuniary cost of providing an ET program to individuals who have more education should be lower and these individuals are expected to have higher earnings. These factors cause NSB_{ETi} to be higher. In contrast, the public may be less willing to provide welfare to individuals with more education and these individuals may suffer more stigma from receiving welfare. These two factors should lower NSB_{SAi} for individuals with more education and, thus, cause the net effect of more education on NSB_i^* to be positive.

Different family situations (*e.g.*, single person, single parent, or a couple) may have different effects on NSB_i^*. In particular, a single person is expected to have a higher NSB_i^* than the other types of families while a single parent family could have either a lower or higher NSB_i^*.

The NSB_{ETi} for single employable persons should be high. If single persons are unlucky and unemployed, society may be willing to support them temporarily to improve their human capital, and, thus, their job opportunities and earnings, since this may reduce their likelihood of participating in welfare in the future. The NSB_{SAi} for single employable persons could be lower than that for the other family types, even though they may receive lower welfare payments, because the public may not want single employable persons to depend on welfare and may expect them to try harder to look for a job.

For single parents, the NSB_{ETi} may be lower than for single persons or two-person families, especially if they have very young children. For single parents to participate in ET programs, welfare administrators may have to provide welfare benefits and the cost of childcare. This would increase the pecuniary cost of single parent ET program participation. Moreover, the net social benefit of requiring single parents to participate in ET programs could be low since ET program participation might increase a family's childcare difficulties. Nonetheless, NSB_{SAi} for single parent families could be either higher or lower than for single person or two-person families. Single parent families may be on welfare longer than single person or two-person families since they may find it difficult to work and take care of children at the same time. This reduces NSB_{SAi}. On the other hand, the non-pecuniary benefit of providing welfare to single parent families may be higher than providing it to persons in the other family types, probably due to public sympathy. This, in turn, increases NSB_{SAi}.

The number of children can have either a negative or a positive effect on NSB_i^*. Since the welfare benefit rate increases with the number of children, the number of children increases the cost of providing welfare. A family with more children, therefore, may have a lower NSB_{SAi}. Yet, the non-pecuniary social benefit of welfare may increase with the number of children in a family since society may want to reduce the number of children living in poverty. (Although they may also not want to encourage low income families to have more children.) Thus, the pecuniary and non-pecuniary benefits of social assistance may counteract each other. As a result, NSB_{SAi} increases with the number of children if the non-pecuniary social benefit is very large, but NSB_{SAi} decreases with the number of children if an additional child substantially increases the cost of welfare. The pecuniary and non-pecuniary benefits of providing ET programs to families with more children may be low since society may not be willing to force individuals from families with more children to participate in ET programs and the cost of childcare may be higher. Therefore, the effect of the number of children on NSB_{ETi} is expected to be negative. However, given the ambiguity of the effect of the number of children on NSB_{SAi}, the impact on NSB_i^* is also ambiguous.

Finally, the main reasons given by survey respondents for participating in welfare may also affect a welfare administrator's decision to select an individual to participate in an ET program. The two reasons given that are likely to be observed by welfare administrators are unemployment and a health problem.[15] If unemployment is associated with low skills, individuals who are on welfare because of unemployment should benefit from participating in ET programs. An individual who is on welfare because he/she is unemployed is expected, therefore, to have a high NSB_{ETi} value. On the other hand, an individual who is on welfare as a result of being unemployed may have a low NSB_{SAi} since the public may not view unemployment as a good excuse for welfare participation. Therefore, individuals who are on welfare due to unemployment are expected to have a higher NSB_i^* than individuals with other reasons for being on welfare.

Individuals who cite a health problem as being the cause of their welfare participation are expected to have a lower NSB_i^* than other individuals. Since they have a health problem, these individuals may not be able to fully participate in ET programs. They may also not gain as much from ET programs if they are forced to participate in these programs. Thus, individuals with a health problem may be associated with a low NSB_{ETi} value. In contrast, NSB_{SAi} may be high for individuals who are on welfare because of a health problem. This may be because they are in a difficult period and may need financial support. The public may be more willing to support them than individuals with other reasons for being on welfare.

iii) Estimation Method

For simplicity, we assume a linear function for NSB_i^*:

(4.3) $NSB_i^* = X_{1i}\alpha_1 + \varepsilon_i,$

[15] The other reasons, such as "partner left," are not included because they may not be observed by welfare administrators.

where ε_i is an error term with a standard normal distribution. In general, NSB_i^* is unobserved, but whether or not an individual participates in ET programs is observed. Let ET_i equal one if individual *i* participates in an ET program, and equal zero otherwise.

$$(4.4) \quad ET_i = 1 \qquad \text{if } NSB_i^* > 0\text{, and}$$
$$= 0 \qquad \text{otherwise.}$$

Following the discussion in the previous sub-sections, the expected signs of variables in equation (4.3) are shown in Table 4.13.

Given equations (4.3) and (4.4), the probability that a welfare recipient will be selected to participate in an ET program is given by:

$$\begin{aligned}(4.5) \quad \Pr(ET_i = 1) &= \Pr(NSB_i^* > 0)\\ &= \Pr(X_{1i}\alpha_1 + \varepsilon_i > 0)\\ &= \Pr(\varepsilon_i > -X_{1i}\alpha_1)\\ &= \Pr(\varepsilon_i < X_{1i}\alpha_1)\\ &= \Phi_1(X_{1i}\alpha_1),\end{aligned}$$

where Φ_1 is a cumulative normal distribution function. Therefore, equation (4.3) is estimated using a probit model where the log-likelihood function is (Greene, 1993, p. 883):

$$(4.6) \quad \ln L = \sum_{ET_i=1} \ln \Phi_1(X_{1i}\alpha_1) + \sum_{ET_i=0} \ln[1 - \Phi_1(X_{1i}\alpha_1)].$$

The data used to estimate equation (4.3) are the cross-section data described in section 4.3.2. Each observation in the data pertains to an individual who received welfare for at least one month during the period 1993-96. This data set is used because welfare administrators may select welfare recipients to participate in an ET program based on the recipients' personal and household characteristics. Since these characteristics are assumed to be unchanged during the 1993-96 period, it is appropriate to use the cross-section data in this estimation rather than the pooled data set.

4.4.2 The Effect of ET Programs on Welfare-Work Decisions

In this section, we focus on the behaviour of welfare recipients when the social assistance program provides employment and training programs. Specifically, we will model how ET programs affect the probabilities of being off welfare and the probabilities of working for former, future and current welfare recipients. As detailed below, the model is based on the assumption that welfare recipients maximize their utility by choosing whether they want to work and whether they want to be on or off welfare.

Assume that an individual's utility (U_i) is a monotonic, strictly increasing quasi-concave function of leisure (ℓ_i) and consumption of a composite commodity (C_i), and a linear function of the distaste for welfare[16] or non-pecuniary cost (ϕ_i) of welfare participation. Thus, utility can be written as:

(4.7) $U_i = U(\ell_i, C_i) - \phi_i\,(1 - EX_i)$,

where EX_i is a dummy variable indicating whether an individual is currently *not* on welfare.[17] Specifically, the variable EX_i equals one if an individual is currently *not* on

---

[16] This can also represent the taste for work. Individuals who have a high distaste for welfare may have a high taste for work.

[17] In contrast to the analysis in Chapter 3, the analysis here assumes that welfare administrators do not restrict welfare applicants from receiving welfare. That is, it is assumed that all welfare applicants receive benefits if they are eligible. This assumption may not be too restrictive since our sample includes only former or present welfare recipients. All of them must have been eligible applicants, and they were selected for welfare at some point during the four-year period 1993 to 1996.

welfare, and equals zero otherwise. The individual's utility increases as leisure and/or consumption increases. Being on welfare ($EX_i = 0$) reduces an individual's utility by ϕ_i.

The distaste for welfare, the non-pecuniary cost of being on welfare, or welfare stigma (ϕ_i),[18] varies from individual to individual and is assumed to be a function of a vector of explanatory variables Z_{1i}:

(4.8) $\phi_i = \phi(Z_{1i})$,

where the vector Z_{1i} includes personal and household characteristics such as age, gender, education, family type and number of children, as well as the unemployment rate and dummy variables that reflect each individual's reasons for being on welfare (*e.g.*, being unemployed, having a health problem or having been left by their partner). Any changes in these factors are expected to affect the non-pecuniary cost of receiving welfare. The predicted signs of these variables are discussed subsequently; while a more discussion of the non-pecuniary cost of receiving welfare is provided in chapter 3.

The individual's budget constraint is:

(4.9) $C_i \leq Y_i = w_iH_i + N_i + B_i\,(1 - EX_i)$,

where w_i is the hourly wage rate, H_i is hours of work (where $H_i + \ell_i$ is total time available, and ℓ_i represents leisure hours), N_i is non-labour income, and B_i is the welfare benefit. Thus, total income is comprised of labour income, non-labour income, and the welfare benefit.

[18] These terms are used interchangeably. They all refer to the feeling of disgrace that may accompany the receipt of welfare.

The wage rate is likely to be a function of age, gender, the level of education and family status, and may vary with the seasons (all these variables are included in a vector Z_{2i}) and the unemployment rate (UN). The wage rate may also depend on ET program participation. For example, the wage rate may increase with the number of months of ET program participation, but may not increase further, or may increase at a decreasing rate, once a certain amount of ET program participation has occurred. Individuals who are participating in ET programs may have a low wage rate since their skills have not yet improved and their work flexibility may be limited by the ET program itself. However, once they have completed the ET program, they may receive a higher wage rate. Therefore, the variables used to represent the effect of ET program participation on the wage are the number of months an individual has been participating in ET programs and this value squared (mET_i and mET_i^2) as well as dummy variables representing whether the individual currently participates or previously participated in ET programs (ET_{1i} and ET_{2i}). Given these assumptions, the wage rate function can be written as:

(4.10) $w_i = w(Z_{2i}, ET_{1i}, ET_{2i}, mET_i, mET_i^2, UN)$,

where ET_{1i} equals one if individual *i* currently participates in ET programs and zero otherwise, and ET_{2i} equals one if individual *i* previously, but not currently, participated in ET programs and equals zero otherwise. The predicted signs of these variables are discussed subsequently.

The welfare benefit in the budget constraint is determined by the welfare benefit equation:

(4.11) $B_i = \max\{0, B_i' - N_i - \max\{0, t\,(w_iH_i - I_x)\}\}$, where B_i' is the basic welfare benefit, t is the welfare tax rate or clawback rate, and I_x is the level of earnings exempted from being clawed back. In other words, the net welfare benefit, B_i, is the basic benefit less non-labour income and the welfare tax. The amount of the welfare tax is equivalent to the tax rate, t, multiplied by earnings in excess of the earnings exemption.

i) Work Decision

An individual maximizes (4.7) subject to (4.9) and (4.11) by choosing H_i and EX_i. Holding EX_i constant at its optimal level, the optimal choice of H_i is a function of the wage rate and net non-labour income:

$$
\begin{aligned}
(4.12)\quad H_i &= H(w_i, N_i) && \text{if } EX_i = 1, \\
&= H(w_i, B_i') && \text{if } EX_i = 0 \text{ and } w_iH_i \le I_x, \text{ and} \\
&= H(w_i(1-t), B_i' + tI_x) && \text{if } EX_i = 0 \text{ and } w_iH_i > I_x.
\end{aligned}
$$

The labour supply function of welfare non-recipients, those for whom $EX_i = 1$ is optimal (*i.e.*, in the survey data used here, former and future welfare recipients who are currently not on welfare), is determined by w_i and N_i, while the labour supply function of current welfare recipients who have $EX_i = 0$ is determined by w_i and B_i' when earnings are below the earnings exemption, and by $w_i(1-t)$ and $B_i' + tI_x$ when earnings are above the earnings exemption. With a higher wage rate, leisure becomes more expensive and an individual tends to work more hours (*i.e.*, the substitution effect). A higher wage rate also increases labour income which has a negative effect on hours of work (*i.e.*, the income effect). Thus, a higher wage rate (w_i or $w_i(1-t)$) is expected to increase labour supply if the substitution effect is stronger than the income effect. Higher non-labour income (N_i,

B_i', or $B_i' + tI_x$) is expected to have a negative effect on labour supply if leisure is a normal good.

ii) Welfare Decision

Given the utility-maximizing value of H_i from equation (4.12) and the corresponding values of Y_i and B_i from the budget constraint and the benefit equation, the indirect utility (V_i) functions for a welfare non-recipient (for whom $EX_i = 1$ is optimal) and a welfare recipient (for whom $EX_i = 0$ is optimal) are:

$$
\begin{aligned}
(4.13)\quad V_i &= V(w_i, N_i) && \text{if } EX_i = 1, \\
&= V(w_i, B_i') - \phi_i && \text{if } EX_i = 0 \text{ and } w_iH_i \le I_x, \text{ and} \\
&= V(w_i(1-t), B_i' + tI_x) - \phi_i && \text{if } EX_i = 0 \text{ and } w_iH_i > I_x.
\end{aligned}
$$

The welfare recipient's decision to be off welfare is determined by the utility difference (EX_i^*):

$$
\begin{aligned}
(4.14)\quad EX_i^* &= V(w_i, N_i) - V(w_i, B_i') + \phi_i && \text{if } w_iH_i \le I_x, \text{ and} \\
&= V(w_i, N_i) - V(w_i(1-t), B_i' + tI_x) + \phi_i && \text{if } w_iH_i > I_x.
\end{aligned}
$$

A current welfare recipient exits from welfare or a current non-recipient remains off welfare ($EX_i = 1$) if $EX_i^* > 0$ (*i.e.*, if the maximum utility attained without receiving welfare is greater than the maximum utility when welfare is received). Otherwise he/she remains on or enters welfare.

As the indirect utility function is non-decreasing in the wage rate (w_i), and w_i is greater than $w_i(1 - t)$, a higher wage rate is likely to increase the EX_i^* of an individual who earns above I_x and, thus, the likelihood that he/she is not on welfare. A higher welfare tax rate reduces the net wage rate ($w_i(1 - t)$) of welfare recipients and, in turn, may increase their EX_i^* and the likelihood of being off welfare. The indirect utility function is also non-decreasing in non-labour income (N_i). Higher non-labour income is, therefore, expected to increase EX_i^*. A higher net welfare benefit (B_i' or $B_i' + tI_x$) increases the financial resources of welfare recipients, and this may reduce their EX_i^*. Welfare stigma is expected to have a positive impact on EX_i^* as it reduces the utility of welfare participation.[19]

iii) Welfare and Work Decisions

It is assumed that an individual maximizes his/her utility (4.7) by simultaneously choosing hours of work (H_i) and welfare participation (EX_i). Therefore, equations (4.12) and (4.14) are determined jointly. However, hours of work are sometimes unobserved.[20] Instead, what is usually observed is whether an individual worked ($WK_i = 1$) or did not work ($WK_i = 0$). Thus, equation (4.12) is redefined as:

$$
\begin{aligned}
(4.15)\quad H_i^* &= H(w_i, N_i) && \text{if } EX_i = 1, \\
&= H(w_i, B_i') && \text{if } EX_i = 0 \text{ and } w_iH_i \le I_x, \text{ and} \\
&= H(w_i(1 - t), B_i' + tI_x) && \text{if } EX_i = 0 \text{ and } w_iH_i > I_x,
\end{aligned}
$$

where H_i^* is unobserved hours of work, and

$$
\begin{aligned}
(4.16)\quad WK_i &= 1 && \text{if } H_i^* > 0 \text{ and} \\
&= 0 && \text{otherwise.}
\end{aligned}
$$

[19] More details of the comparative static analysis are given in Chapter 3, sections 3.2.2 and 3.2.3, where $EX_i = 1 - P_i$.

[20] In the data set used in this paper, data on H_i are included, but because many individuals reported unreasonably high weekly hours of work, these data are not used (that is, H_i is treated as though it was unobserved).

By substituting the welfare stigma function (equation (4.8)) and the wage rate function (equation (4.10)) into equations (4.14) and (4.15), and rewriting these equations, we obtain the following:[21]

(4.17) $EX_i^* = EX(Z_{1i}, Z_{2i}, ET_{1i}, ET_{2i}, mET_i, mET_i^2, UN, N_i^*)$,

$EX_i = 1$ if $EX_i^* > 0$ and

$= 0$ otherwise,

(4.18) $H_i^* = H(Z_{1i}, Z_{2i}, ET_{1i}, ET_{2i}, mET_i, mET_i^2, UN, N_i^*)$,

$WK_i = 1$ if $H_i^* > 0$ and

$= 0$ otherwise,

where N_i^* is a vector of non-labour income that is defined as:

$N_i^* = [N_i]$ if $EX_i = 1$,

$= [N_i, B_i']$ if $w_iH_i \leq I_x$ or $EX_i = 0$ and $w_iH_i \leq I_x$, and

$= [t, N_i, B_i' + tI_x]$ if $w_iH_i > I_x$ or $EX_i = 0$ and $w_iH_i > I_x$.

From equations (4.12) and (4.15), the desired level of work hours depends on whether or not the individual chooses to receive welfare. As a result, H_i^* will depend on all the variables which determine the individuals budget constraint and their taste for work as well as the variables that determine whether or not the individual chooses to receive welfare (the determinants of the optimal choice of EX_i). For this reason, the explanatory variables that enter equations (4.17) and (4.18) are identical.

---

[21] As in chapter 3, we linearize the budget constraint for each welfare recipient. The linearization of the budget constraint gives a unique solution to the utility maximization problem for each individual.

iv) Predictions

Since the welfare non-participation (equation (4.17)) and work participation (equation (4.18)) equations are determined jointly, any changes in Z_{1i}, Z_{2i}, ET_{1i}, ET_{2i}, mET_i, mET_i^2, UN, and N_i^* may affect both an individual's welfare and work decisions. Variables in the Z_{1i} vector are expected to affect EX_i^* and H_i^* through changes in welfare stigma (ϕ_i). These variables affect H_i^* because EX_i^* and H_i^* are joint decisions. Individuals who are more likely to be off welfare ($EX_i^* > 0$) may also be more likely to work ($H_i^* > 0$) and *vice versa*. Thus, if the variables in Z_{1i} have negative (positive) effects on stigma, they should also have negative (positive) effects on EX_i^* and H_i^*. Variables in the vector Z_{2i}, and ET_{1i}, ET_{2i}, mET_i, mET_i^2, and UN are expected to affect EX_i^* and H_i^* through changes in the wage rate. The effects of these variables on EX_i^* and H_i^* are expected to have the same signs as their effects on the wage rate since the wage rate tends to have a positive effect on EX_i^* and H_i^* (if the substitution effect outweighs the income effect). That is, if these variables have negative (positive) effects on the wage rate, they are also likely to have negative (positive) effects on H_i^* and EX_i^*. Any changes in N_i^* affect individual's budget constraint, and, thus, H_i^* and EX_i^*. The predicted signs of coefficients for this model are shown in Table 4.14.

Personal and household characteristics that affect welfare stigma are in the vector Z_{1i}. It is expected that the young and poorly educated may have lower welfare stigma, while females may have either higher or lower welfare stigma.[22] Single parent families

[22] Low welfare stigma implies a low distaste for welfare, or a high distaste for work.

with more children may be associated with low stigma since they may feel that they are needy and deserve more public sympathy.

Variables that represent the reasons for being on welfare are usually unobserved, but they could affect welfare stigma. For example, persons who are on welfare because of a health problem may have lower stigma because they may feel that the public may understand that persons with health problems are unable to work or have a difficult time working. Persons who are on welfare because they are unemployed may have higher stigma than those who are on welfare for other reasons. This may be because some members of the public may not view unemployment as an acceptable reason for being on welfare. Thus, welfare recipients who receive welfare for this reason may feel more uncomfortable than those who receive welfare for other reasons. Finally, welfare recipients who were left by their partner may have either low or high stigma. These recipients may be very needy and have no other options. It may be difficult for these recipients to find work if they have previously been receiving financial support from their partner and have been out of labour force for some time. These reasons may drive them to rely on welfare. However, some recipients may turn to relatives or friends for help or try to find work if they have a very strong negative feeling about receiving welfare.

A higher unemployment rate may lower stigma because a higher unemployment rate may make welfare use more widespread and common. A higher unemployment rate may also have a negative effect on the wage rate and earnings. With a higher unemployment rate, some workers may have to reduce their wages in order to keep their jobs. This will affect both EX_i^* and H_i^*.

Additional variables that affect the wage rate are the variables in the vector Z_{2i} as well as ET_{1i}, ET_{2i}, mET_i, mET_i^2 and seasonal factors. A person who has few job opportunities may have a lower wage rate since he/she may be less competitive. Therefore, a person who has low education may have a lower wage rate. Females may have a lower wage rate due to gender discrimination. A young person may have less work experience and may, therefore, receive a lower wage rate. The wage rate may also vary due to seasonal influences. For example, there may be more jobs for low skilled persons during the summer months. This may increase the wage rates of this type of worker.

The wage rate of welfare recipients who currently participate in ET programs ($ET_{1i} = 1$) may be low because ET program participation may indicate that the participant lacks skills or does not have the time to work full-time. Individuals who previously participated in ET programs, but currently do not participate in ET programs ($ET_{2i} = 1$), are expected to earn a higher wage rate since they may have improved their skills and human capital.

The number of months spent in an ET program (mET_i) may also affect the wage rate although possibly in a nonlinear way. In particular, while the effect of the number of months of ET program participation on the wage rate may be positive, this positive effect may not continue, or may be reduced, if a participant spends a long time on many ET programs and/or does not look for work. In such a case, as the number of months in ET programs increases, each additional month in an ET program may have a smaller positive effect on the wage rate, and eventually this effect may become negative. Therefore, while the coefficient on mET_i is expected to be positive, the coefficient on mET_i^2 is expected to be negative.

Besides welfare stigma (ϕ_i) and the wage rate (w_i), the welfare tax rate (t) and net non-labour income (N_i, B_i' or $B_i' + tI_x$) also affect H_i^* and EX_i^* through changes in the budget constraint. A higher welfare tax rate reduces the effective wage rate, $w_i(1 - t)$, and earnings. With a lower effective wage rate, an individual tends to work less if the substitution effect is stronger than the income effect. Therefore, a higher welfare tax rate is likely to reduce H_i^* and, thus, the probability of working. A higher welfare tax rate could also have a negative impact on the earnings of welfare recipients who work. This may, in turn, increase EX_i^* and hence the probability that an individual does not receive welfare.

Non-labour income (N_i) tends to have a negative effect on H_i^* and the probability of working, but a positive effect on EX_i^* and the probability of being off welfare. With higher non-labour income, if leisure is a normal good, an individual will increase their hours of leisure and reduce their hours of work. Welfare recipients may also want to leave welfare when they have more non-labour income since this type of income is not associated with stigma and is 100 percent clawed back if they remain on welfare.

A higher welfare benefit (B_i' or $B_i' + tI_x$) is expected to have a negative impact on EX_i^* and H_i^*. This is simply because a higher benefit increases the attractiveness of welfare and, thus, despite the effect of stigma, welfare recipients may not want to leave welfare. In addition, a higher welfare benefit increases a welfare recipient's non-labour income and, in turn, may reduce an individual's incentive to work (*i.e.*, the income effect).

In the next sub-section, the method of estimating the work and welfare participation equations is described. The welfare tax rate (t), the earnings exemption (I_x), and non-labour income (N_i) variables are not included in the econometric specification for two reasons. First, the welfare tax rate and the earnings exemption are not included because they do not vary from individual to individual. After the reforms in 1993, there was only one welfare tax rate and one level of earnings exemption instead of three. Second, the data used in this study contains no information on non-labour income. This omitted factor is, therefore, included in the constant and unobserved error terms.

v) Estimation Method

Assuming a linear specification for equations (4.17) and (4.18), we have:

(4.19) $EX_i^* = \beta_0 + Z_{1i}\beta_1 + Z_{2i}\beta_2 + ET_{1i}\beta_3 + ET_{2i}\beta_4 + mET_i\beta_5 + mET_i^2\beta_6 + B_i'\beta_7 + UN\beta_8 + u_{1i}$

(4.20) $H_i^* = \delta_0 + Z_{1i}\delta_1 + Z_{2i}\delta_2 + ET_{1i}\delta_3 + ET_{2i}\delta_4 + mET_i\delta_5 + mET_i^2\delta_6 + B_i'\delta_7 + UN\delta_8 + u_{2i},$

where u_{1i} and u_{2i} are error terms with a bivariate normal distribution.

Since a welfare recipient makes a joint decision of whether to work and whether to stay off welfare, the probability of working and being off welfare is determined by:

(4.21) $\Pr(EX_i = 1, WK_i = 1) = \Pr(EX_i^* > 0, H_i^* > 0)$

$= \Pr(\beta_0 + Z_{1i}\beta_1 + Z_{2i}\beta_2 + ET_{1i}\beta_3 + ET_{2i}\beta_4 + mET_i\beta_5 + mET_i^2\beta_6 + B_i'\beta_7 + UN\beta_8 + u_{1i} > 0, \delta_0 + Z_{1i}\delta_1 + Z_{2i}\delta_2 + ET_{1i}\delta_3 + ET_{2i}\delta_4 + mET_i\delta_5 + mET_i^2\delta_6 + B_i'\delta_7 + UN\delta_8 + u_{2i} > 0)$

$= \Pr(u_{1i} > -(\beta_0 + Z_{1i}\beta_1 + Z_{2i}\beta_2 + ET_{1i}\beta_3 + ET_{2i}\beta_4 + mET_i\beta_5 + mET_i^2\beta_6 + B_i'\beta_7 + UN\beta_8), u_{2i} > -(\delta_0 + Z_{1i}\delta_1 + Z_{2i}\delta_2 + ET_{1i}\delta_3 + ET_{2i}\delta_4 + mET_i\delta_5 + mET_i^2\delta_6 + B_i'\delta_7 + UN\delta_8))$

$= \Pr(u_{1i} > -(Z_{EX}\beta), u_{2i} > -(Z_H\delta))$

$$= \int_{-Z_{EX}\beta}^{\infty} \int_{-Z_{H}\delta}^{\infty} \phi_2(u_{1i}, u_{2i}; \rho)\, du_{2i}\, du_{1i}$$

$$= \Phi_2(Z_{EX}\beta, Z_H\delta; \rho), \qquad \text{(Greene, 1993, pp. 906-8)},$$

where ϕ_2 and Φ_2 are bivariate normal density and cumulative density (distribution) functions, respectively; Z_{EX} and Z_H are vectors of the variables in the EX_i^* and H_i^* equations; β and δ are vectors of coefficients associated with the variables in Z_{EX} and Z_H, respectively; and ρ is the correlation between the error terms in the H_i^* and EX_i^* equations. The sign of ρ is expected to be positive since a higher than average desire to work is likely to be associated with a higher than average desire to be off welfare. Following the discussion in the previous sub-sections, the expected signs are shown in Table 4.14.

The parameters in equations (4.19) and (4.20) are estimated using a bivariate probit regression. The log-likelihood function is (Greene, 1993, pp. 908):

$$\text{(4.22)} \quad \ln L = \sum_{EX_i=1, WK_i=1} \ln \Phi_2(Z_{EX}\beta, Z_H\delta; \rho) + \sum_{EX_i=1, WK_i=0} \ln \Phi_2(Z_{EX}\beta, -Z_H\delta; -\rho) + \sum_{EX_i=0, WK_i=1} \ln \Phi_2(-Z_{EX}\beta, Z_H\delta; -\rho) + \sum_{EX_i=0, WK_i=0} \ln \Phi_2(-Z_{EX}\beta, -Z_H\delta; \rho).$$

The data used to estimate the parameters in equations (4.19) and (4.20) are pooled cross-section time-series data. As explain in section 4.3.2, there are 15,936 observations in the sample set. Each observation represents an individual in a month between January 1993 and December 1996 who received welfare for at least one month during the four-year period 1993-96. Monthly observations are used to estimate the welfare-work decision equations as the factors that affect these decisions (such as the factors that affect the wage rate) tend to change monthly.

In section 4.3.1, we argued that ET program participation could be a result of administrative selection. Welfare administrators may select an individual who has a comparative advantage (*i.e.*, high NSB_i^*) and who is more likely to work or remain off welfare following the ET program than would a randomly selected individual. If this hypothesis is true, ET program participation (ET_{1i} and ET_{2i}) is not random with respect to u_{1i} and u_{2i}. This may result in selection bias.

To correct for selection bias, it would be necessary to estimate equations (4.19) and (4.20) conditional on ET program participation (*i.e.*, $Pr(EX_i^* > 0, H_i^* > 0 | ET_{1i} = 1$ or $ET_{2i} = 1))$. Since estimation of this probability is somewhat complicated, and the selection bias may not be significant, we may gain some intuition from the estimates obtained under the assumption that ET program participation is random. However, in section 4.4.3 we will evaluate the effect of ET program participation on earnings with and without a sample selection correction included. A comparison of the two sets of results may provide some indication of the seriousness of the selection bias problem.

4.4.3 The Effect of ET Programs on Current Earnings

In this sub-section, we model the effect of ET programs on the current earnings of individuals when ET program participation is determined by welfare administrators. It should be noted that the model described here is estimated using cross-section data in order to address the impact of ET program participation during the period 1993-96 on individuals' earnings in December 1996 (the last month of the survey period). As explained in section 4.3.2, each observation represents an individual who received welfare benefits for at least one month in 1993-96. Current earnings are used instead of the average earnings from the jobs held in the 1993-96 period because individuals may have worked at jobs during different time periods, and they may have either participated or not participated in ET programs before working at each job. For example, a person who did not work from January 1993 to May 1996, participated in an ET program from June 1996 to October 1996, and worked at a job that paid $1,000 per month from November 1996 to December 1996, has lower average monthly earnings in 1993-96 than another person who worked at a job that paid $500 per month from January 1996 to December 1996. Therefore, using average earnings over the sample period may blur the effect of ET program participation.

An earnings function (E_i) is obtained by multiplying the wage rate (equation (4.10)) by hours of work (equation (4.12)): $E_i = w_iH_i$. A reduced form function of earnings can be written as:

(4.23) $E_i = E(Z_{1i}, Z_{2i}, ET_{1i}, ET_{2i}, mET_i, mET_i^2, UN, N_i^{*})$.

The effect on E_i of variables in the vector Z_{1i} (stigma equation) and Z_{2i} (wage equation) is expected to have the same direction as the effect of these variables on the wage rate and hours of work since $E_i = w_iH_i$ and w_i tends to have a positive effect on H_i. If a variable in the vectors Z_{1i} and Z_{2i} has a positive (negative) impact on w_i or H_i, it is expected that it will also have a positive (negative) impact on earnings.

Current ET program participation (ET_{1i}) is expected to have a negative effect on current earnings because individuals who are participating in ET programs may be less likely to work and their wage rates may be low. Previous ET program participation (ET_{2i}) is expected to have a positive effect on earnings since it may increase the probability of working and the wage rate. The variables mET_i and mET_i^2 are expected to have positive and negative signs, respectively. The number of months of ET program participation may have a positive effect on current earnings since more extensive participation in ET programs may improve the individual's stock of human capital and their wage rate. However, the effect of an additional month of ET program participation may become smaller after some point.

A higher unemployment rate may reduce the probability of getting a job and the wage rate and, thus, may reduce current earnings. Non-labour income (N_i, a variable in the vector $N_i^{\bullet}$) and welfare benefits (B_i' and $B_i' + tI_x$, the other variables in the vector $N_i^{\bullet}$) should have a negative effect on earnings since they tend to have negative effects on hours of work.

Since the provincial unemployment rate (UN),[23] welfare benefit rate (B_i')[24] and welfare tax rate (t) are invariant across individuals, and because N_i is unobserved, these variables are eliminated from the earnings function.

A linear specification is assumed for the earnings function (equation (4.23)). Further, to illustrate the effect that administrative selection may have on the estimated coefficients, the earnings function is initially simplified by imposing the restrictions that $ET_{1i} = ET_{2i} = ET_i$ and $mET_i = mET_i^2 = 0$. Thus, the simplified earnings equation is:

$$(4.24)\quad E_i = \gamma_0 + Z_{1i}\gamma_1 + Z_{2i}\gamma_2 + ET_i\gamma_3 + \upsilon_i,$$

where υ_i is a random error with zero mean and constant variance. The variable ET_i equals one if an individual participates in ET programs in any month during the survey period

[23] There is no data on the intra-provincial location of individuals in the sample.

[24] The welfare benefit varies by type of family. A family type variable is already included in the explanatory variables.

(*i.e.*, $ET_{1i} = 1$ or $ET_{2i} = 1$). If ET_i is non-stochastic, the effect of ET programs on earnings can be measured by γ_3. In this case, the least squares estimates are unbiased and consistent.

However, ET_i could be determined by the administrative selection process described in section 4.4.1:

$$(4.3) \quad NSB_i^* = X_{1i}\alpha_i + \varepsilon_i, \qquad \text{where} \quad ET_i = 1 \text{ if } NSB_i^* > 0 \text{ and } ET_i = 0 \text{ otherwise.}$$

In this specification, welfare administrators select an individual to participate in an ET program if $NSB_i^* > 0$, where NSB_i^* is based on the individual's characteristics (X_{1i}). Because of this administrative selection, ET_i is not determined randomly and, thus, $E(ET_i\ \upsilon_i) \neq 0$ and $E(\upsilon_i|\text{sample selection}) \neq 0$. This may occur because of stochastic dependence between υ_i and ε_i (*e.g.*, a hard-working person (this indicator is not in X_{1i}, Z_{1i} or Z_{2i}) may be more likely to be selected to participate in an ET program and may be more likely to have high earnings) or because of stochastic dependence between υ_i and X_{1i} (*e.g.*, a person with more education (a variable in X_{1i}) may also have more ability (a characteristic which may affect υ_i)).

To correct for selection bias, it is necessary to consider expected earnings conditional on sample selection. Following Barnow, Cain and Goldberger (1980), the expected values of equation (4.24) conditional on $ET_i = 1$ and on $ET_i = 0$ are as follows:[25]

[25] The condition $ET_i = 1$ implies ($ET_{1i} = 1$ and $ET_{2i} = 1$) or ($ET_{1i} = 1$ and $ET_{2i} = 0$) or ($ET_{1i} = 0$ and $ET_{2i} = 1$) while the condition $ET_i = 0$ implies $ET_{1i} = 0$ and $ET_{2i} = 0$.

(4.25) $E(E_i|ET_i = 1) = \gamma_0 + Z_{1i}\gamma_1 + Z_{2i}\gamma_2 + \gamma_3 + E(\upsilon_i|ET_i = 1)$

$$= \gamma_0 + Z_{1i}\gamma_1 + Z_{2i}\gamma_2 + \gamma_3 + \sigma_{\upsilon\varepsilon}\phi_1(-X_{1i}\alpha_1)/[1 - \Phi_1(-X_{1i}\alpha_1)]$$

$$= \gamma_0 + Z_{1i}\gamma_1 + Z_{2i}\gamma_2 + \gamma_3 + \sigma_{\upsilon\varepsilon}\phi_1(X_{1i}\alpha_1)/ \Phi_1(X_{1i}\alpha_1),$$

and

(4.26) $E(E_i|ET_i = 0) = \gamma_0 + Z_{1i}\gamma_1 + Z_{2i}\gamma_2 + E(\upsilon_i|ET_i = 0)$

$$= \gamma_0 + Z_{1i}\gamma_1 + Z_{2i}\gamma_2 + \sigma_{\upsilon\varepsilon}(-\phi_1(-X_{1i}\alpha_1))/ \Phi_1(-X_{1i}\alpha_1)$$

$$= \gamma_0 + Z_{1i}\gamma_1 + Z_{2i}\gamma_2 + \sigma_{\upsilon\varepsilon}(-\phi_1(X_{1i}\alpha_1))/[1 - \Phi_1(X_{1i}\alpha_1)],$$

where ϕ_1 and Φ_1 are, respectively, the density and distribution functions for a standard normal variable, and $\sigma_{\upsilon\varepsilon} = Cov(\upsilon_i, \varepsilon_i)$ which is expected to be positive (*i.e.*, an individual who is likely to be selected to participate in an ET program may have relatively high earnings whether or not he/she participates in the ET program).

Therefore, expected earnings conditional on ET_i are:

(4.27) $E(E_i|ET_i) = \gamma_0 + Z_{1i}\gamma_1 + Z_{2i}\gamma_2 + ET_i\,(\gamma_3 + \sigma_{\upsilon\varepsilon}\phi_1(X_{1i}\alpha_1)/ \Phi_1(X_{1i}\alpha_1))$

$$+ (1 - ET_i)\,\sigma_{\upsilon\varepsilon}(-\phi_1(X_{1i}\alpha_1))/[1 - \Phi_1(X_{1i}\alpha_1)].$$

Greene (1993) showed that if we estimate (4.24) by least squares the coefficient estimate on ET_i equals $\gamma_3 + \sigma_{\upsilon\varepsilon}\phi_1(X_{1i}\alpha_1)/ \Phi_1(X_{1i}\alpha_1)[1 - \Phi_1(X_{1i}\alpha_1)]$. Since the covariance, the density and distribution functions are all positive, the least squares estimates are likely to overstate the effect of ET programs on earnings.

In equation (4.27), we have shown how to correct for selection bias when a discrete explanatory variable (ET_i) is nonrandom. Now we drop the restrictions that $ET_{1i} = ET_{2i} = ET_i$ and $mET_i = mET_i^2 = 0$, and rewrite the earnings equation (4.24) as:

(4.28) $E_i = \gamma_0 + Z_{1i}\gamma_1 + Z_{2i}\gamma_2 + ET_{1i}\gamma_3 + ET_{2i}\gamma_4 + mET_i\gamma_5 + mET_i^2\gamma_6 + \upsilon_i.$

The two continuous variables, mET_i and mET_i^2, may be correlated with the error as may ET_{1i} and ET_{2i}. When the explanatory variables (*i.e.*, ET_{1i}, ET_{2i}, mET_i and mET_i^2) are correlated with the error, the estimated parameters are biased and inconsistent (Greene, 1993).

i) Estimation Method

For the sake of comparison and to examine the robustness of the estimates in light of the selection problem described above, the earnings equation is estimated using three methods. In the first method, equation (4.28) is estimated using ordinary least squares (OLS). In the second method, the earnings equation is estimated using a two-step method suggested by Barnow *et al.* (1980). The third method involves estimating equation (4.28) using Instrumental Variables (IV). In order to make the estimation methodology clear, a brief description of the latter two estimation procedures is provided here.

The two-step method of Barnow *et al.* (1980) involves first estimating equation (4.5) using a probit regression. The estimated parameters from this regression procedure ($\hat{\alpha}_1$) can be used to obtain estimates of $\phi_1(X_{1i}\alpha_1)$ and $\Phi_1(X_{1i}\alpha_1)$. The following earnings function is then estimated by least squares:

$$(4.29)\quad E_i = \gamma_0 + Z_{1i}\gamma_1 + Z_{2i}\gamma_2 + ET_{1i}\gamma_3 + ET_{2i}\gamma_4 + mET_i\gamma_5 + mET_i^2\gamma_6 + \sigma_{\upsilon\varepsilon}\hat{\lambda}_i + \eta_i,$$

where η_i is a random error with zero mean and constant variance, $\hat{\lambda}_i$ equals $\phi_1(X_{1i}\hat{\alpha}_1)/\Phi_1(X_{1i}\hat{\alpha}_1)$ when $ET_i = 1$ and $-\phi_1(X_{1i}\hat{\alpha}_1)/(1-\Phi_1(X_{1i}\hat{\alpha}_1))$ when $ET_i = 0$, and $\phi_1(X_{1i}\hat{\alpha}_1)$ and $\Phi_1(X_{1i}\hat{\alpha}_1)$ are the estimates of $\phi_1(X_{1i}\alpha_1)$ and $\Phi_1(X_{1i}\alpha_1)$, respectively. The variables included in equations (4.5) and (4.29) and their expected signs are shown in Tables 4.13 and 4.14.

In the previous section, it was shown that augmenting the vector of explanatory variables in the earnings equation with $\hat{\lambda}_i$ can correct for the selection bias associated with ET_i. However, equation (4.29) includes the variables ET_{1i}, ET_{2i}, mET_i and mET_i^2, all of which could introduce selection bias, rather than ET_i. Specification of the appropriate selection bias correction with four, potentially not independent, variables is a problem which, to our knowledge, has not been solved (and which is beyond the scope of this thesis). Since all four of the ET variables are non-zero only if $ET_i = 1$, it is possible that including the selectivity correction for ET_i (*i.e.*, $\hat{\lambda}_i$) in the estimating equation may be sufficient to correct for the selectivity bias arising from all four variables.

Since the approach used in the second estimation method may not be adequate to correct for selection bias, a third method is also used to estimate the parameters of the earnings equation. This method deals with the potential endogeneity of ET_{1i}, ET_{2i}, mET_i and mET_i^2 by estimating the parameters of equation (4.28) using two stage least squares (2SLS) or Instrumental Variables (IV). This method requires the instruments to be correlated with the variables in equation (4.28), but not with the error term (*i.e.*, υ_i). Moreover, the number of instrumental variables must be at least as large as the number of explanatory variables in the earnings equation (Greene, 1993, p. 288). The instrumental variables used are the variables in the vectors Z_{1i}, Z_{2i}, and X_{1i} as well as $\Phi_1(X_{1i}\hat{\alpha}_1)$ which is computed using estimates of equation (4.5).

4.4.4 Summary

To sum up, the following steps will be implemented. First, the ET program participation equation (4.5) is estimated by a probit regression using cross-section data. It is expected that welfare administrators select welfare recipients to participate in ET programs based on individual and household characteristics (X_{1i}). Second, the welfare non-participation (4.19) and work participation equations (4.20) are estimated by a bivariate probit regression using pooled cross-section time-series data. It is expected that welfare recipients who currently participate in ET programs have lower probabilities of working and being off welfare. Individuals who have completed ET programs are expected to have higher probabilities of working and being off welfare. Third, we use cross-section data and the estimates of equation (4.5) to compute $\hat{\lambda}_i$. This variable is then used to augment equation (4.28), yielding equation (4.29), as a correction for selection bias. Equations (4.28) and (4.29) are estimated by OLS. We expect that the selection correction in (4.29) will reduce the estimated effect of ET programs on earnings relative to the OLS estimates of (4.28). Finally, we re-estimate equation (4.28) by 2SLS (instrumental variables) to remedy the inconsistency that may occur when ET related variables are endogenous.

4.5 Empirical Results

Empirical results for the ET program participation and earnings models (sections 4.4.1 and 4.4.3) are presented together in section 4.5.1 because the second method used to estimate the earnings equation requires estimation of the ET program participation equation. The parameter estimates of the welfare non-participation and work participation equations (section 4.4.2) are discussed in section 4.5.2. Definitions of all the variables used to generate the estimates are given in Table 4.15.

4.5.1 ET Program Participation and Earnings

In this section, results are presented for a probit regression of the ET program participation equation as well as for the three different estimates of the earnings equation. All of the estimates are generated using cross-section data (408 observations). ET program participation (ET_i) is a function of personal and household characteristics such as age, gender, education, family status, the number of children and reasons for being on welfare (UNEMP and HEALTH). Earnings is a function of personal and household characteristics, current and previous ET program participation (ET_{1i} and ET_{2i}), the number of months of ET program participation and its square (mET_i and mET_i^2) as well as dummy variables representing the reasons for welfare participation (UNEMP, HEALTH and LEFT).[26] It is expected that current ET program participation has a negative effect on an individual's current earnings. Previous ET program participation and the number of months in ET programs are expected to have a positive effect on an individual's current earnings. However, the number of months in ET programs may have a diminishing positive effect. Therefore, the sign on mET_i^2 is expected to be negative.

i) ET Program Participation

Estimates of the ET program participation equation (equation (4.3)) are presented in Table 4.16. The reference case is an individual who is female, older than 44, lives in a two-person family,[27] and has high school education.

---

[26] The variable LEFT is not included in the ET equation because it is assumed that this reason for welfare participation is not observable by administrators.

[27] A two-person family represents a couple with or without children.

Specification (1) in Table 4.16 includes dummy variables representing age groups (*i.e.*, A24, A2534, and A3544), gender (GENDER), the level of education (*i.e.*, ELEM, LHSC, and POST), family status (*i.e.*, SINGLE and SP), the number of children (KID) and reasons for welfare participation (*i.e.*, UNEMP and HEALTH). The parameter estimates on A24, A2534, POST and SP are statistically significant at the 5 percent level. A LR test of specification (1) rejects the hypothesis that the explanatory variables jointly have no effect on the probability of ET program participation.

Specification (2) adds interactive terms involving age and education, gender and family status, family status and education, and family status and the reason for welfare participation. These variables are added to examine the robustness of the explanatory power of specification (1). Moreover, these interactive dummy variables allow us to focus on specific types of individuals (*e.g.*, single parents who have better than high school education) who may have a higher or lower probability of ET program participation.[28]

The coefficient estimates on A24, A2534LH, POST and SPPOST are statistically significant at the 5 percent level. These results indicate that individuals who are younger than 24 have the highest probability of participating in ET programs, compared to the other age groups. Individuals who are in age group 25-34 and have less than high school education also have a higher probability of participating in ET programs. Individuals who have more than high school education have a higher probability of participating in ET

[28] The results where each of these interactive terms are individually omitted are not shown here because they are quite similar to specification (2) in terms of the signs and statistical significance of the parameters.

programs. In this specification, the coefficient estimates on SPPOST indicate that single parents have a higher probability of participating in ET programs if they have higher than high school education.

The LR test of specification (2) rejects the hypothesis that the coefficients on all the variables are zero (LR = 68.55). When we test the hypothesis that the additional variables in specification (2) are jointly insignificant, the LR test that treats specification (1) as the restricted model and specification (2) as the unrestricted model does not reject the hypothesis (LR = 19.78, where $\chi^2_{(.05, 13)} = 22.36$ and $\chi^2_{(.10, 13)} = 19.81$).

In this section, we find that individuals with certain characteristics (*e.g.*, individuals who are younger than 24 or single parents who have better than high school education) have a higher probability of ET program participation. According to the ET program participation model, welfare administrators are more likely to select those individuals who are young or who have a better education to participate in ET programs. However, gender, the number of children and reasons for welfare participation are not factors that welfare administrators use for ET selection.

ii) Earnings Equation

The earnings equation is estimated using three methods: OLS (method (1)), OLS with a selectivity correction term ($\hat{\lambda}_i$) (method (2)) and IV (method (3)). Results are shown in Table 4.17 when the earnings equation includes mET_i and mET_i^2 and Table 4.18 when mET_i and mET_i^2 are excluded.

The results from methods (1) and (2) show that the coefficient on current ET program participation (ET_{1i}) has a negative sign and is statistically significant at the 5 percent level. Coefficients on previous ET program participation (ET_{2i}), the number of months participating in ET programs (mET_i), and its square (mET_i^2), have the expected signs, but are not statistically significant. The coefficients on GENDER, ELEM, LHSC and HEALTH are statistically significant at the 5 percent level. The coefficient on gender has a positive sign which means that males have higher earnings than females, other things being constant. The coefficients on elementary and less than high school education have negative signs. Individuals who have elementary school education have the lowest earnings. Moreover, individuals who were on welfare due to health problems have much lower earnings.

In method (3), the earnings equation is estimated using an IV method. The instrumental variables used are all of the explanatory variables in the earnings equation (except ET related variables) and in the extended ET program participation equation (specification (2) in Table 4.16) as well as the expected value of ET program participation (*i.e.*, $E(ET_i) = Pr(ET_i = 1) = \Phi_1(X_{1i}\alpha_1)$).[29] Using this method, the coefficients on GENDER, ELEM, HEALTH and ET_{1i} are statistically significant at the 5 percent level and have the same signs as in methods (1) and (2). Unlike the previous two methods, the coefficient on ET_{2i} has an unexpected negative sign, although it is insignificant.

Since the number of months of ET program participation and its square are not statistically significant in all three methods, the earnings equation was re-estimated without these variables. Table 4.18 shows that, in this case, the results from all three

[29] There are insufficient instruments if only the explanatory variables from specification (1) are used as instrumental variables. IV estimation of the earnings equation requires the number of instruments to be at least as large as the number of explanatory variables in the earnings equation.

methods are quite similar to those in the previous Table. The exclusion of mET_i and mET_i^2 has almost no effect on the estimates.

From Table 4.18, the coefficient estimates on GENDER, ELEM, LHSC and HEALTH have the same signs as those in Table 4.17 for all methods. However, an interesting result is that the magnitude of the coefficient on ET_{1i} using method (3) (−1245.30) is almost 5 times larger than that obtained using methods (1) (−272.85) or (2) (−269.39). The estimates in method (3) imply that current ET program participation reduces participants' earnings by approximately $1,245 per month. This estimate appears to be unreasonably large since the sample average level of earnings is $508 per month, and about 81 percent of former and current welfare recipients earned less than $1,000 per month (Table 4.6). This result, which calls into question the usefulness of method (3), could possibly be the consequence of the choice of instruments.

We conclude from the estimates of the earnings equation that the current earnings of former and current welfare recipients are determined by current ET program participation, gender, education, and whether a health problem is the main reason for being on welfare. Based on methods (1) and (2), respectively, individuals who currently participate in ET programs have approximately $102-$444 and $43-$495 lower current earnings than other individuals.[30] This may be because they are less likely to work concurrently with ET program participation. Moreover, the completion or abandonment

[30] These values represent 95 percent confidence intervals for the true effect of ET on earnings. This 95 percent confidence interval is calculated as $\gamma_4 \pm t_{.05} \times$ (standard error of γ_4) which is $-272.85 \pm (1.645)(104.07)$ for method (1), and $-269.39 \pm (1.645)(137.30)$ for method (2).

of ET programs does not have a significant positive effect on earnings. Overall, ET program participation does not have a positive effect on an individual's earnings.

We found in this section that mET_i and mET_i^2 are not significant determinants of current earnings under either of the three estimation methods employed. In addition, the endogeneity of ET_{1i} and ET_{2i} may not cause a serious problem with respect to the use of OLS since the OLS estimates are fairly similar to the estimates obtained when a selection correction ($\hat{\lambda}_i$) was included.

4.5.2 Welfare Non-Participation and Work Participation

This section describes the estimates of the welfare non-participation and work participation equations (equations (4.19) and (4.20)) which are estimated using a bivariate probit regression. The data used contain 15,936 pooled cross-section time-series observations.[31]

The welfare non-participation (EX_i) and work participation (WK_i) equations are functions of personal and household characteristics, the reasons for being on welfare, current and previous ET program participation, the number of months of ET program participation and its square, the welfare benefit and the unemployment rate (Table 4.14). Details of these variables are presented in Table 4.15.

Table 4.19 presents the estimation results. The first half of the table is for the welfare non-participation equation (EX_i) and the second half is for the work participation equation (WK_i). Five specifications of the EX_i and WK_i equations are estimated.

---

[31] The empirical results that include only individuals with 3 jobs or less (13,680 observations) are not shown here because they are quite similar to those for the full sample.

Specification (1) includes all the explanatory variables that were discussed in section 4.4.2. Specifications (2) to (5) delete some of the explanatory variables that are not statistically significant.

Specification (1) shows that ET program participation has a significant impact on the probability of being off welfare. The coefficients on ET_{1i} and ET_{2i} are negative and statistically significant. The sign on ET_{2i} is contrary to the prediction. While the coefficient estimates on mET_i (the number of months participating in ET program) and mET_i^2 have positive and negative signs as predicted,[32] the coefficient on mET_i^2 is not statistically significant.

ET program variables such as ET_{1i}, ET_{2i} and mET_i have significant effects on the probability of working (the second half of the table). The coefficient estimates on these variables have the expected signs. The coefficient on mET_i^2 also has the expected sign (negative), but it is insignificant.

The welfare benefit and unemployment rate have an insignificant effect on the probability of being off welfare. The welfare benefit variable may be correlated with the number of children variable since the benefit varies with the number of children. This may explain its insignificance. However, as predicted, the welfare benefit and unemployment rate have a negative effect on the probability of working.

Regarding personal and household characteristics such as age, education and family type, specification (1) shows that these characteristics have significant effects on

---

[32] The number of months in ET programs is rescaled by dividing by 100 in order to facilitate convergence.

the probability of being off welfare and the probability of working. Other characteristics such as gender and the number of children have significant impacts only on the probability of working.

The dummy variables representing reasons for welfare participation are all statistically significant. Moreover, the monthly dummy variables that were added to capture seasonal influences are all statistically insignificant in the welfare non-participation equation. This implies that seasonal variation does not influence individual decisions to be on or off welfare. On the other hand, the results show that seasonal variation affects the probability of working. At a 10 percent level of significance, individuals have a higher probability of working in January, July and October.

When all the monthly dummy variables are deleted (specification (2)), there is no noticeable change in the parameter estimates. However, the LR test in Table 4.20 rejects the joint hypothesis that there are no seasonal influences on the probability of working and on the probability of being off welfare. This rejection could be the result of the significant seasonal effects on the probability of working.

Specification (3) deletes the mET_i^2 variable from the welfare non-participation and work participation equations since it is insignificant in both equations. The coefficient estimates in specifications (2) and (3) are fairly similar. The LR test (LR = 2.82) does not reject the hypothesis that mET_i^2 has no effect on the probabilities of being off welfare and of working.

In specifications (1) to (3), the coefficients on the benefit rate have unexpected signs in the welfare non-participation equation, although these coefficients are insignificant. Specification (4) excludes the number of children variable (KID) from the estimating equation because it has no effect on the probability of welfare non-participation in specifications (1) to (3) and it may be correlated with the benefit rate. The results show that, with this exclusion, the coefficient on the welfare benefit (in the first half of the table) becomes statistically significant and has a negative sign as predicted by the theory. However, the exclusion of the number of children variable has a major impact on the coefficient on the single parent dummy variable (SP) in the work participation equation. The coefficient changes from a negative sign to a positive sign and it is significant. Not surprisingly, the LR test (Table 4.20) rejects the hypothesis that the coefficients on KID are zero (LR = 90.66). This suggests that the number of children variable should be included in the work participation equation.

In specification (5) the number of children is included in the work participation equation, but not in the welfare non-participation equation. Since the probability of working is affected by seasonal variation, the four monthly dummy variables that previously had significant coefficients are also included. The results show that all the parameter estimates in the work participation equation have the same signs as those in specification (1). For the welfare non-participation equation, all the coefficient estimates in specification (5) are quite similar to those in specification (1), except for the coefficients on the welfare benefit and the unemployment rate. The LR test in Table 4.20 strongly rejects the hypothesis that the coefficients on KID, JAN, JULY and OCT in the work participation equation are zero (LR = 117.74).

Finally, the estimates of the correlation parameter, ρ, are positive and statistically significant in all specifications. This implies that the error terms in the welfare and desired hours equations are positively correlated. As a consequence, an individual who is more likely to be off welfare is also more likely to be working, other things being constant.

According to specification (5), we conclude that current ET program participation has a negative effect on welfare non-participation and work participation. That is, individuals who are participating in ET programs have lower probabilities of being off welfare and of working. Since these individuals are participating in ET programs, they may not have time to find work or to work and, as a result, they may need financial assistance.

The coefficients on previous ET program participation indicate that this variable has a positive effect on work participation. This implies that individuals who have completed or left ET programs may have a better opportunity of getting a job. Furthermore, in the probability of being off welfare equation, the coefficient on the previous ET program participation variable is negative, but the coefficient on the number of months in ET programs is positive. These results imply that previous short-term ET program participation has a negative impact on the probability of being off welfare. However, previous ET program participation will have a positive effect on the probability of being off welfare if this participation lasted longer than 21 months.[33]

The coefficient on mET_i indicates that this variable also has a positive effect on the probability of working. The longer that individuals participate in ET programs, the

---

[33] In specification (5), the coefficient estimates are −0.2147 for ET_{2i} and 1.003 for mET_i. The net effect of the number of months of ET program participation is calculated by the equation: $-0.2147 + 1.003/100\ (mET_i) = 0$. The 21 months of ET program participation may seem to be too long. This result is due to the fact that ET programs also include high school upgrading and post-secondary education programs. For all 214 ET program participants, 13 participants were in the high school upgrading program and 17 participants were in the post-secondary program.

higher their probabilities of being off welfare and of working. This might imply that long-term ET participants may have improved their skills and may have better job opportunities.

As predicted, the welfare benefit has a negative effect on both the probability of being off welfare and the probability of working. A higher benefit rate reduces an individual's incentive to work and increases the attractiveness of welfare.

The coefficient on the unemployment rate has a positive sign, and is statistically significant in the welfare non-participation equation, which is contrary to the prediction. However, the unemployment rate has a negative effect on the probability of working, as predicted.

Regarding personal characteristics such as age, gender and education, the results show that individuals who are younger than 45 have a higher probability of being off welfare and working. Individuals who are younger than 25 have the highest probability of being off welfare, while individuals who are in the 35-44 age group have the highest probability of working. Males and females do not have a different probability of being off welfare. However, males have a higher probability of working. With respect to the effect of the level of education, individuals who have more than high school education have the highest probability of being off welfare and of working.

The coefficient estimates associated with the family status variable show that single person families have a higher probability of being off welfare than do single parent families. Yet, they have a lower probability of working than do individuals from other family types. Individuals in families with more children tend to have a higher probability of working.

The coefficient estimates associated with the reasons for welfare participation show that the coefficient on UNEMP has a positive sign in the welfare non-participation equation, but a negative sign in the work participation equation. The coefficients on HEALTH are negative in both equations. If a health problem is the main reason that an individual is on welfare, his/her probability of working and being off welfare is lower than that of other individuals with different reasons for being on welfare. This is consistent with the predictions.

The coefficient on LEFT has a positive sign in the welfare non-participation equation, but a negative sign in the work participation equation. This might imply that welfare recipients who are left by their partner[34] rely on welfare only temporarily. They have a higher probability of being off welfare than do welfare recipients with other reasons for welfare participation. However, they have a lower probability of working, which may be because they are not in the labour force and are used to receiving financial support from their partner.

From the estimates presented in this section, we conclude that ET program participation, the number of months in ET programs, the welfare benefit and the unemployment rate have significant impacts on an individual's welfare and work decisions. Regarding ET program participation, individuals who currently participate in ET programs have lower probabilities of being off welfare and of working. Individuals who completed or left ET programs have a higher probability of working. However, previous ET program participation will have a positive impact on the probability of being

[34] Ninety-two percent of observations with this reason are female.

off welfare only if an individual has participated in the ET program for a long period of time. Personal and household characteristics such as age, the level of education and family status, and the reasons for being on welfare have significant effects on both the probability of working and the probability of being off welfare. Males and two-person families with more children have a higher probability of working. The results also show that an individual's decisions to work and to be off welfare are positively correlated.

4.6 Conclusions

In this paper, we construct a model of ET program participation that is based on the assumption that, from among welfare recipients, welfare administrators select individuals to participate in ET programs who are likely to have a comparative advantage, or who are likely to have better job opportunities. Administrators choose an individual to participate in an ET program if the net present value of the social benefit of providing an ET program to the individual, either with or without welfare benefits, is higher than the net present value of the social benefit of providing only welfare benefits. Administrative selection is based on personal and household characteristics. The analysis also examines whether ET program participation enhances the current earnings of welfare recipients and whether ET program participation affects the probability of working and being off welfare.

As predicted, our results show that individual characteristics such as age and the level of education, and family status have significant impacts on the probability of ET program participation. However, contrary to the model's prediction, single persons are not found to be associated with a higher probability of ET program participation. This may be because they choose to leave welfare rather than participate in ET programs.

Previous ET program participation does not have a positive effect on current earnings. Three different methods of estimating the earnings function show that the earnings of former and current welfare recipients is determined by current ET program participation, gender, education and whether they have a health problem at the time they receive welfare benefits. Current ET program participation has a significant negative effect on participants' earnings.

Moreover, we find that individuals who completed or left ET programs have a higher probability of working. This could be because individuals who completed ET programs have better job opportunities and are more likely to find work. Individuals who chose to leave ET programs without completion may have had to find paid employment if their welfare benefits had been cut off. Yet, if an individual is participating in an ET program, he/she has a lower probability of working. This could be because ET program participation consumes time and makes an individual unavailable for work. Our results show that the longer the period of ET participation, the higher the probability of working.

Concerning welfare non-participation, we find that ET program participation does not increase the probability that an individual stays off welfare even though he/she may have completed an ET program. However, if he/she spends a long period of time participating in ET programs, his/her probability of being off welfare is higher. It is likely that welfare recipients are cut off from welfare when they have successfully completed all the ET programs.

The findings from this paper provide clear conclusions that ET program participation has a positive impact on a welfare recipient's probability of becoming employed, but does not increase the earnings of participants. This finding casts some doubt on the effectiveness of the ET initiatives that were associated with the Alberta welfare reforms in increasing participants' earnings.

In addition to the effect of the ET initiatives, the reforms that reduced the benefit rate succeeded in increasing welfare non-participation and work participation. Since our analysis does not take into account the tightening of welfare eligibility policy, we cannot make conclusions concerning that policy. However, we expect that it may have had a strong effect on welfare non-participation since a benefit reduction alone may not have been strong enough to cause the large fall in the number of welfare recipients in Alberta in 1993-96.

Our analysis of the welfare non-participation and work participation equations does not deal with the sample selection problem that may arise in this framework, although this problem does not appear to be serious in the earnings equation. That is, ET program participation may not be an exogenous variable since it could result from both individual and welfare administrator decisions. For example, we find that single persons with post-secondary education are associated with a lower probability of ET program participation than single parents with the same level of education. This may be because single persons think that ET program participation consumes time but does not increase their earnings. Thus, they may choose to leave welfare and try to find work, and do not participate in ET programs. Therefore, they tend to have $ET_{1i} = 0$ or $ET_{2i} = 0$. In this case, it may be more appropriate to view the ET program participation, welfare non-participation and work participation decisions as being made jointly by the welfare recipient. Given the econometric techniques employed in this study, it is not possible to account for these three decisions jointly, as well as administrative selection.

Finally, due to the small sample size, the ET program variable used in our empirical analysis combines all the employment and training initiatives into a single ET program. It would be interesting to investigate the effect on earnings of each ET program separately. It may be possible that some ET programs may increase participants' earnings, while others may not. Analysis of these issues is left for future research.

Table 4.1 Caseloads and Expenditures on Supports For Independence

	Mar-93[1]	Mar-94[2]	Mar-95[2]	Mar-96[2]
Expenditure ($1,000)				
Program delivery	n.a.	47,637	42,277	40,179
E & T support	n.a.	308,481	178,371	166,230
Supplement to earnings	n.a.	107,230	93,487	83,061
Transitional support	n.a.	201,237	113,481	94,841
Assured support	n.a.	123,407	89,625	94,658
Maintenance and Recovery	n.a.	3,326	3,365	3,223
SFI ($1,000)	**886,210**	**791,318**	**520,606**	**482,192**
Employment & Training Initiatives	10,366	27,069	27,686	32,105
ET as % of SFI	1.17	3.42	5.32	6.66
Caseloads[3]				
Clients expected to work	84,925	51,962	41,290	37,613
Clients not expected to work-AS	9,162	10,432	10,979	11,160
Total	**94,087**	**62,394**	**52,269**	**48,773**

Source: [1]AFSS, *Alberta Welfare Reforms Progress Report March 1993 – December 1995.*
[2]AFSS, *Annual Reports 1994/95 – 1995/96.*
[3]AFSS (Central Client Directory).
Notes: SFI = Supports For Independence. AS = Assured Support program.

Table 4.2 The Number of Clients in Employment Initiatives

Program	Mar-94	Mar-95	Mar-96
Alberta Community Employment	1,712	3,232	3,257
Employment Skills Program	1,572	1,240	732
Alberta Job Corps	267	853	1,223
Basic Foundation Skills (upgrading)	11,000	8,381	6,279
Skills Training (Post-secondary under 2 years)		4,185	3,646
Training on the Job	3,371	620	494
Employment Alternative Program		7,644	9,312
Job Placement		6,272	3,182
Integrate Training		776	1,045
Total number of clients	**17,922**	**33,203**	**29,170**

Source: AFSS, *Annual Reports 1994/95-1995/96.*

Table 4.3 Eligibility Review

Year	# cases reviewed	# cases closed	% cases closed	Resulting in a savings of ($ m.)
1993/94	67,385	11,048	16.40	6.2
1994/95	46,385	8,979	19.36	5.1
1995/96	31,893	6,911	21.67	4.0

Source: AFSS, *Annual Report* 1994/95-1995/96.

Table 4.4 Welfare Benefit Comparison (Pre vs. Post Welfare Reform)

Type of Client	Benefit	1992/93	1995/96	% change
Single employable adult	Standard and shelter	$470	$394	–16.2
	Supplementary and medical	$95	$65	–31.6
	Monthly total	**$565**	**$459**	**–18.8**
Single parent with one child 0-11 years	Standard and shelter	$842	$766	–9.0
	Supplementary and medical	$191	$129	–32.5
	Monthly total	**$1,033**	**$895**	**–13.4**
Family – two adults with 1 child less than 12 years, 1 child greater than 12 years	Standard and shelter	$1,308	1,206	–7.8
	Supplementary and medical	$240	$152	–36.7
	Monthly total	**$1,548**	**$1,358**	**–12.3**

Source: AFSS, *Alberta Welfare Reforms Progress Report March 1993 – December 1995.*

Table 4.5 PRL Sample Distribution (497 persons)

Classification	(PRL Survey) Welfare recipients in		(Administrative data) Welfare recipients in	
	1993	1996	1993	1996
Gender (%)				
Male	31		38	36
Female	69		62	64
Age group (%)				
15-19	7	4	6	4
20-24	20	18	17	15
25-34	32	34	34	32
35-44	28	27	23	25
45-54	8	11	12	15
55-64	5	6	8	9
Family type (%)				
Single person	24	22	43	45
Single parent	41	45	38	39
Couple-no children	8	9	5	5
Couple-have children	27	24	14	12

Source: Shillington (1998), Tables 2 and 3.

Table 4.6 Descriptive Statistics: Cross-Section Data (408 persons)

Category	Frequency	Percent
Age		
18-19	10	2.45
20-24	74	18.14
25-29	68	16.67
30-34	74	18.14
35-39	78	19.12
40-44	36	8.82
45-49	32	7.84
50-54	13	3.19
55-59	11	2.70
60-64	12	2.94
Gender		
Male	126	30.88
Female	282	69.12
Family type		
Single person	91	22.30
Single parent	156	38.24
Couple-no children	36	8.82
Couple-have children	125	30.64
Level of education		
Less than high school	71	17.40
Some high school	102	25.00
High school	96	23.53
Diploma or some post-secondary	121	29.66
University degree	18	4.41
Number of children in the household		
0	127	31.13
1-2	200	49.02
3-4	74	18.14
5-8	7	1.72
Reason for being on welfare		
Unemployed	114	27.94
Health issue	45	11.03
Income insufficient	68	16.67
Partner left	38	9.31
Others	143	35.05
Monthly current earnings		
$0	223	54.66
< $500	31	7.60
$500-749	32	7.84
$750-999	44	10.78
$1,000-1,499	35	8.58
$1,500-1,999	19	4.66
$2,000-2,499	11	2.70
$2,500-2,999	6	1.47
> $3,000	7	1.72

Table 4.7 Reason for Being on Welfare (408 persons)

Monthly earnings	Reason for being on welfare				
	Unemployed	Health issue	Income insufficient	Partner left	Others
$0	57	38	26	23	79
< $500	9	0	11	2	9
$500-749	8	0	8	3	13
$750-999	10	1	10	4	19
$1,000-1,499	16	2	8	2	7
$1,500-1,999	4	2	3	1	9
$2,000-2,499	6	0	0	2	3
$2,500-2,999	3	1	1	1	0
> $3,000	1	1	1	0	4
Total (persons)	114	45	68	38	143

Table 4.8 ET Program Participation (408 persons)

Monthly earnings	Participated in ET programs in December 1996		Did not participate in ET programs in December 1996	
	Did not participate in ET programs before	Participated in ET programs before Dec. 1996	Did not participate in ET programs before	Participated in ET programs before Dec. 1996
$0	29	17	102	75
< $500	2	3	14	12
$500-749	0	0	16	16
$750-999	2	0	22	20
$1,000-1,499	1	4	11	19
$1,500-1,999	0	0	9	10
$2,000-2,499	0	1	8	2
$2,500-2,999	0	1	2	3
> $3,000	0	0	3	4
Sub-Total	34	26	187	161
Total	60		348	

Table 4.9 The Number of Months in ET Programs by Current Earnings (408 persons)

Monthly earnings	The number of months in ET programs			
	0	1-6	7-12	> 12
$0	106	52	26	39
< $500	14	8	5	4
$500-749	17	1	5	9
$750-999	23	8	6	7
$1,000-1,499	12	8	8	7
$1,500-1,999	9	4	2	4
$2,000-2,499	8	0	2	1
$2,500-2,999	2	2	1	1
> $3,000	3	1	1	2
Total (person)	194	84	56	74

Table 4.10 Descriptive Statistics: Pooled Data (15,936 observations)

Category	Frequency	Percent
Age		
18-19	384	2.41
20-24	3,168	19.88
25-29	2,592	16.27
30-34	2,832	17.77
35-39	3,216	20.18
40-44	1,344	8.43
45-49	1,104	6.93
50-54	480	3.01
55-59	432	2.71
60-64	384	2.41
Gender		
Male	4,512	28.30
Female	11,424	71.70
Family type		
Single person	3,408	21.39
Single parent	6,240	39.16
Couple-no children	1,344	8.43
Couple-have children	4,944	30.82
Level of education		
Less than high school	2,208	13.85
Some high school	3,936	24.70
High school	4,080	25.60
Diploma or some post-secondary	4,992	31.32
University degree	720	4.52
Number of children in a household		
0	4,752	29.82
1-2	7,920	49.70
3-4	2,976	18.67
5-7	288	1.81
Number of jobs since Jan. 93		
0	3,216	20.18
1	4,224	26.51
2	3,984	25.00
3	2,256	14.16
4-6	1,776	11.14
7-10	336	2.11
11-30	144	0.90
Reason for being on welfare		
Unemployed	4,368	27.41
Health issue	1,344	8.43
Income insufficient	2,736	17.17
Partner left	1,776	11.14
Others	5,712	35.84

Table 4.10 (Concluded)

	Frequency	Percent
Total annual household income before taxes		
$0	288	1.81
< $5,000	2,448	15.36
$5,000-10,000	2,592	16.26
$10,000-15,000	3,072	19.28
$15,000-20,000	1,920	12.05
$20,000-25,000	1,152	7.23
$25,000-30,000	1,056	6.63
$30,000-35,000	432	2.71
$35,000-40,000	576	3.61
$40,000-45,000	288	1.81
$45,000-50,000	288	1.81
$50,000-60,000	240	1.51
$60,000-70,000	144	0.90
$70,000-80,000	96	0.60
$80,000-90,000	0	0
$90,000-100,000	48	0.30
> $100,000	48	0.30
no response	1,248	7.83
Monthly earnings from job#1		
$0	3,360	21.08
< $500	2,352	14.76
$500-749	2,208	13.85
$750-999	2,688	16.87
$1,000-1,499	2,688	16.87
$1,500-1,999	1,056	6.63
$2,000-2,499	816	5.12
$2,500-2,999	336	2.11
> $3,000	432	2.71
Monthly earnings from job#2		
$0	7,680	48.19
< $500	2,112	13.25
$500-749	1,680	10.54
$750-999	1,584	9.94
$1,000-1,499	1,344	8.43
$1,500-1,999	576	3.61
$2,000-2,499	528	3.31
$2,500-2,999	288	1.81
> $3,000	144	0.90
Monthly earnings from job#3		
$0	11,616	72.89
< $500	912	5.72
$500-749	1,008	6.32
$750-999	912	5.72
$1,000-1,499	672	4.22
$1,500-1,999	336	2.11
$2,000-2,499	240	1.51
$2,500-2,999	96	0.60
> $3,000	144	0.90
Total	**15,936**	**100.00**

Table 4.11 Work, Welfare and ET Participation

	On welfare		Total
	No	Yes	
Work			
No	6,640	3,740	10,380
Yes	4,293	1,263	5,556
Current ET program participation			
No	9,765	4,174	13,939
Yes	1,168	829	1,997
Previous ET program participation[1]			
No	9,173	4,102	13,275
Yes	1,760	901	2,661
Total	**10,933**	**5,003**	**15,936**
	Work		**Total**
	No	**Yes**	
Current ET program participation			
No	8,949	4,990	13,939
Yes	1,431	566	1,997
Previous ET program participation[1]			
No	9,167	4,108	13,275
Yes	1,213	1,448	2,661
Total	**10,380**	**5,556**	**15,936**

Note: [1]Observations associated with an individual who completed or left ET programs and are not participating in ET programs in the current month.

Table 4.12 The Number of Months of ET Program Participation (15,936 observations)

	The number of months of ET program participation			
	0	1-6	7-12	> 12
On welfare				
No	8,092	1,338	718	785
% of col. total	70.67	61.07	65.75	65.25
Yes	3,358	853	374	418
% of col. total	29.33	38.93	34.25	34.75
Work				
No	7,868	1,294	578	640
% of col. total	68.72	59.06	52.93	53.20
Yes	3,582	897	514	563
% of col. total	31.28	40.94	47.07	46.80
Total	**11,450**	**2,191**	**1,092**	**1,203**

Table 4.13 Variables in the NSB_i^* Equation and Predicted Signs

Variables	NSB_{ETi}	NSB_{SAi}	NSB_i^*
AGE = age	+/–	+	+/–
GENDER = 1 for male.	+	+/–	+/–
EDUC = years of education.	+	–	+
SINGLE = 1 for single person.	+	–	+
SP = 1 for single parent family.	–	+/–	+/–
COUPLE = 1 for two-person family (reference case).			
KID = number of children.	–	+/–	+/–
UNEMP = 1 if being unemployed is the main reason for being on welfare.	+	–	+
HEALTH = 1 if having a health problem is the main reason for being on welfare.	–	+	–

Table 4.14 Variables in EX_i^*, H_i^* and E_i Equations and Predicted Signs

Variables	EX_i^*	H_i^*	E_i
ET_1 = 1 if a person currently participates in ET programs.	–	–	–
ET_2 = 1 if a person previously participated in ET programs.	+	+	+
mET = number of months participating in ET programs.	+	+	+
mET^2 = mET × mET	–	–	–
B_i' or $B_i' + tI_x$ = welfare benefit[1]	–	–	–
t = welfare tax[1]	+	–	–
N = non-labour income[1]	+	–	–
UN = unemployment rate	–	–	–
in both Z_{1i} and Z_{2i}			
AGE = age	+	+	+
GENDER = 1 for male.	+/–	+/–	+/–
EDUC = years of education	+	+	+
SINGLE = 1 for single person.	+/–	+/–	+/–
SP = 1 for single parent family.	–	–	–
COUPLE = 1 for two-person family (reference case).			
KID = number of children	–	–	–
in Z_{1i}			
UNEMP = 1 if unemployment is the main reason for being on welfare.	+	+	+
HEALTH = 1 if health issue is the main reason for being on welfare.	–	–	–
LEFT = 1 if partner left is the main reason for being on welfare.	+/–	+/–	+/–
in Z_{2i}			
Seasonal variables: JAN, FEB, APR, MAY, JUNE, JULY, AUG, SEP, OCT, NOV, DEC.	+/–	+/–	

Note: [1]Variables t, I_x, and N are not included in the estimating equations because the t and I_x variables are fixed for all individuals and the N variable is not reported in the survey.

Table 4.15 List of Variables

Variable and Definition
Age
A24 = 1 if individual is younger than 25.
A2534 = 1 if individual is 25-34 years of age.
A3544 = 1 if individual is 35-44 years of age.
A45 = 1 if individual is older than 44 (reference case).
Gender
GENDER = 1 if individual is male.
Education
ELEM = 1 if individual has elementary education or less.
LHSC = 1 if individual has some high school education.
HSC = 1 if individual has high school education (reference case).
POST =1 if individual has more than high school education.
Family type
SINGLE = 1 for single person family.
SP = 1 for single parent family.
COUPLE = 1 for two-person family (reference case).
KID = number of children.
Reason for being on welfare
UNEMP = 1 if being unemployed is the main reason for being on welfare.
HEALTH = 1 if a health problem is the main reason for being on welfare.
LEFT = 1 if partner left is the main reason for being on welfare.
OTHER = 1 if being on welfare for other reasons (reference case).
ET program participation
ET = 1 if individual participates in ET programs currently or previously.
ET_1 =1 if individual currently participates in ET programs.
ET_2 = 1 if individual previously, but not currently, participated in ET programs.
mET = number of months of ET program participation.
$mET^2 = mET \times mET$.
Welfare variable
B' = welfare benefit computed from table 4.4 (units: $1,000).
Labour market variable
UN = unemployment rate/100.[1]

Table 4.15 (Concluded)

Variable and Definition
Seasonal variable
JAN = 1 for observations in January.
FEB = 1 for observations in February.
MARCH = 1 for observations in March (reference case).
APR = 1 for observations in April.
MAY =1 for observations in May.
JUNE = 1 for observations in June.
JULY = 1 for observations in July.
AUG = 1 for observations in August.
SEP = 1 for observations in September.
OCT = 1 for observations in October.
NOV = 1 for observations in November.
DEC = 1 for observations in December.
Interactive terms
Age and education: A24EL = A24 × ELEM, A24LH = A24 × LHSC, A2534EL = A2534 × ELEM, A2534LH = A2534 × LHSC. **Gender and family status:** GS = GENDER × SINGLE, GSP = GENDER × SP, GKID = GENDER × KID. **Family status and education:** SLHSC = SINGLE × LHSC, SPPOST = SP × POST. **Family status and reason for being on welfare:** SUNEMP = SINGLE × UNEMP, SHEALTH = SINGLE × HEALTH, SPUNEMP = SP × UNEMP, SPH = SP × HEALTH.

Note: [1] The unemployment rate is the seasonally unadjusted monthly unemployment rate for individuals in the labour force in Alberta (Source: Cansim label D984005).

Table 4.16 ET Program Participation (ET_i) Equation

Variable	Mean	Specification					
		(1)			(2)		
		Coefficient	t-value	p-value	Coefficient	t-value	p-value
Constant		-0.7936	-3.136	0.00	-0.4980	-1.666	0.10
A24	0.2059	0.8546	3.755	0.00	0.6208	2.041	0.04
A2534	0.3480	0.5330	2.569	0.01	0.1543	0.593	0.55
A3544	0.2794	0.1979	0.952	0.34	0.0705	0.327	0.74
GENDER	0.3088	-0.1264	-0.808	0.42	0.0333	0.104	0.92
ELEM	0.0588	-0.1041	-0.367	0.71	-0.0816	-0.216	0.83
LHSC	0.4216	0.1031	0.702	0.48	-0.2490	-1.039	0.30
POST	0.3529	0.6291	4.012	0.00	0.4660	2.435	0.01
SINGLE	0.2230	0.3613	1.787	0.07	0.2004	0.585	0.56
SP	0.3824	0.4119	2.694	0.01	0.1406	0.626	0.53
KID	1.3970	0.0538	0.850	0.40	0.0565	0.735	0.46
UNEMP	0.3088	-0.0477	-0.318	0.75	-0.2701	-1.143	0.25
HEALTH	0.1103	-0.2584	-1.121	0.26	-0.3162	-0.789	0.43
A24EL	0.0147				0.2305	0.337	0.74
A24LH	0.1103				0.4796	1.297	0.19
A2534EL	0.0074				-0.4069	-0.459	0.65
A2534LH	0.1495				0.7779	2.415	0.02
GS	0.1275				0.2750	0.628	0.53
GSP	0.0392				-0.5044	-1.145	0.25
GKID	0.2696				-0.0714	-0.493	0.62
SLHSC	0.0931				-0.0091	-0.027	0.98
SPPOST	0.1348				0.5994	1.971	0.05
SUNEMP	0.0956				0.1248	0.318	0.75
SHEALTH	0.0417				-0.5095	-0.867	0.39
SPUNEMP	0.0931				0.4063	1.139	0.25
SPH	0.0319				0.5503	0.943	0.35
N		408			408		
Unrestricted log likelihood (Lu)		-257.00			-247.11		
Restricted log likelihood (Lr)		-281.39			-281.39		
LR test[1]		48.76 ($\chi^2_{(.05,12)} = 21.03$)			68.55 ($\chi^2_{(.05,25)} = 37.65$)		

Note: [1] The null hypothesis is the coefficients on all explanatory variables are zero.

Table 4.17 Earnings Equation with mET_i and mET_i^2

Variable	Method (1)			Method (2)			Method (3)		
	OLS			OLS with $\hat{\lambda}$ [a]			IV[b]		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value	Coefficient	asy. t-value	p-value
Constant	478.20	3.472	0.00	472.78	3.438	0.00	499.68	2.491	0.01
A24	-3.53	-0.028	0.98	-13.20	-0.099	0.92	252.19	0.786	0.43
A2534	134.70	1.171	0.24	128.24	1.094	0.27	330.89	1.540	0.12
A3544	165.31	1.447	0.15	163.13	1.453	0.15	214.29	1.260	0.21
GENDER	347.00	4.005	0.00	347.78	4.100	0.00	293.37	2.265	0.02
ELEM	-530.60	-3.360	0.00	-528.06	-3.408	0.00	-555.80	-3.001	0.00
LHSC	-159.81	-1.965	0.05	-160.36	-2.015	0.04	-62.77	-0.527	0.60
POST	76.66	0.872	0.38	70.00	0.757	0.45	168.66	0.872	0.38
SINGLE	-74.26	-0.667	0.50	-77.69	-0.705	0.48	14.38	0.101	0.92
SP	-6.87	-0.081	0.94	-11.32	-0.132	0.90	122.55	0.990	0.32
KID	-18.03	-0.518	0.60	-18.88	-0.550	0.58	3.15	0.061	0.95
UNEMP	-14.70	-0.174	0.86	-14.05	-0.170	0.86	-11.14	-0.110	0.91
HEALTH	-374.54	-3.012	0.00	-371.33	-3.026	0.00	-456.45	-2.967	0.00
LEFT	-134.79	-1.027	0.31	-134.45	-1.048	0.29	-268.05	-1.077	0.28
ET_1	-340.45	-2.880	0.00	-323.60	-2.245	0.02	-1487.30	-2.251	0.02
ET_2	17.05	0.178	0.86	43.11	0.265	0.79	-466.17	-0.712	0.48
MET	9.24	1.005	0.32	9.51	1.046	0.30	15.41	0.211	0.83
MET^2	-0.10	-0.631	0.53	-0.10	-0.665	0.51	0.21	0.169	0.87
$\hat{\lambda}$				-20.97	-0.196	0.84			
N = 408	$R^2 = 0.1444$			$R^2 = 0.1444$			Wald statistic = 49.081		
	adj $R^2 = 0.1071$			adj $R^2 = 0.1049$			$\chi^2_{(.05,17)} = 27.59$		
	F(17, 390) = 3.87			F(18, 389) =3.65					

Note: [a] $\hat{\lambda}$ is derived from specification (2) in Table 4.16.

[b] IV includes interactive terms and $\Phi_1(X_{1i}\hat{\alpha}_1)$ from specification (2) in addition to explanatory variables in the earnings equation.

Table 4.18 Earnings Equation without mET_i and mET_i^2

Variable	1. Method (1)			2. Method (2)			3. Method (3)		
	OLS			OLS with $\hat{\lambda}$ [a]			IV[b]		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value	Coefficient	asy. t-value	p-value
Constant	472.57	3.446	0.00	471.48	3.429	0.00	499.89	2.987	0.00
A24	14.38	0.115	0.91	12.64	0.097	0.92	251.30	1.309	0.19
A2534	139.70	1.221	0.22	138.51	1.190	0.23	293.43	1.915	0.06
A3544	176.21	1.549	0.12	175.84	1.572	0.12	243.09	1.878	0.06
GENDER	342.13	3.956	0.00	342.26	4.035	0.00	271.17	2.604	0.01
ELEM	-534.49	-3.390	0.00	-534.01	-3.443	0.00	-589.75	-3.362	0.00
LHSC	-166.24	-2.060	0.04	-166.34	-2.101	0.04	-123.37	-1.344	0.18
POST	94.35	1.093	0.27	93.16	1.032	0.30	191.55	1.598	0.11
SINGLE	-72.74	-0.654	0.51	-73.39	-0.665	0.51	22.15	0.167	0.87
SP	-12.58	-0.149	0.88	-13.45	-0.156	0.88	73.72	0.680	0.50
KID	-15.46	-0.445	0.66	-15.61	-0.455	0.65	16.85	0.402	0.69
UNEMP	-17.63	-0.210	0.83	-17.51	-0.212	0.83	-41.70	-0.449	0.65
HEALTH	-373.09	-3.004	0.00	-372.48	-3.034	0.00	-417.36	-2.963	0.00
LEFT	-145.18	-1.113	0.27	-145.19	-1.136	0.26	-276.14	-1.677	0.09
ET_1	-272.85	-2.622	0.01	-269.39	-1.962	0.05	-1245.30	-2.196	0.03
ET_2	87.32	1.186	0.24	92.63	0.586	0.56	-146.74	-0.424	0.67
$\hat{\lambda}$				-4.00	-0.038	0.97			
N = 408	$R^2 = 0.1411$			$R^2 = 0.1412$			Wald statistic = 51.62		
	adj $R^2 = 0.1083$			adj $R^2 = 0.1062$			$\chi^2_{(.05,15)} = 25.00$		
	$F(15, 392) = 4.30$			$F(16, 391) = 4.02$					

Note: [a] $\hat{\lambda}$ is computed using the results from specification (2) in Table 4.16.

[b] IV includes interactive terms and $\Phi_1(X_{1i}\hat{\alpha}_1)$ from specification (2) in addition to explanatory variables in the earnings equation.

Table 4.19 Welfare Non-Participation and Work Participation

Variable	Mean	Specification					
		(1)			(2)		
		Coefficient	t-value	p-value	Coefficient	t-value	p-value
EX							
Constant		0.5085	2.569	0.01	0.5035	2.679	0.01
A24	0.2229	0.3832	9.880	0.00	0.3826	9.871	0.00
A2534	0.3404	0.2628	7.120	0.00	0.2624	7.109	0.00
A3544	0.2861	0.1865	5.123	0.00	0.1863	5.114	0.00
GENDER	0.2831	0.0208	0.743	0.46	0.0206	0.738	0.46
ELEM	0.0121	-0.4278	-3.251	0.00	-0.4272	-3.253	0.00
LHSC	0.3855	-0.1070	-4.234	0.00	-0.1072	-4.243	0.00
POST	0.2289	0.2489	8.273	0.00	0.2491	8.287	0.00
SINGLE	0.2139	-0.2463	-4.983	0.00	-0.2495	-5.180	0.00
SP	0.3916	-0.4387	-10.251	0.00	-0.4421	-10.689	0.00
KID	0.1431	-2.5499	-1.377	0.17	-2.3516	-1.344	0.18
UNEMP	0.2741	0.2969	10.687	0.00	0.2969	10.693	0.00
HEALTH	0.0843	-0.2937	-7.085	0.00	-0.2941	-7.093	0.00
LEFT	0.1114	0.2729	7.172	0.00	0.2727	7.170	0.00
ET_1	0.1253	-0.4796	-10.932	0.00	-0.4761	-10.867	0.00
ET_2	0.1670	-0.2242	-5.378	0.00	-0.2241	-5.384	0.00
MET	0.0287	1.2835	2.546	0.01	1.2384	2.454	0.01
MET^2	0.0059	-0.6913	-0.560	0.58	-0.5971	-0.482	0.63
B^*	0.9673	0.2331	0.469	0.64	0.1802	0.384	0.70
UN	0.0830	1.7165	1.276	0.20	1.6649	1.491	0.14
JAN	0.0833	-0.0436	-0.814	0.42			
FEB	0.0833	-0.0220	-0.414	0.68			
APR	0.0833	-0.0270	-0.508	0.61			
MAY	0.0833	-0.0386	-0.735	0.46			
JUNE	0.0833	-0.0402	-0.757	0.45			
JULY	0.0833	-0.0576	-1.085	0.28			
AUG	0.0833	-0.0673	-1.276	0.20			
SEP	0.0833	-0.0327	-0.597	0.55			
OCT	0.0833	-0.0230	-0.425	0.67			
NOV	0.0833	-0.0336	-0.632	0.53			
DEC	0.0833	-0.0316	-0.591	0.55			

Table 4.19 (Continued)

Variable	Mean	Specification (1) Coefficient	(1) t-value	(1) p-value	Specification (2) Coefficient	(2) t-value	(2) p-value
WKt							
Constant		3.2523	15.137	0.00	3.1768	15.457	0.00
A24	0.2229	0.2071	5.043	0.00	0.2053	5.011	0.00
A2534	0.3404	0.2622	6.523	0.00	0.2612	6.512	0.00
A3544	0.2861	0.6142	15.548	0.00	0.6126	15.537	0.00
GENDER	0.2831	0.3277	11.980	0.00	0.3278	12.014	0.00
ELEM	0.0121	-0.2040	-1.417	0.16	-0.2000	-1.408	0.16
LHSC	0.3855	-0.1234	-4.745	0.00	-0.1224	-4.711	0.00
POST	0.2289	0.1667	5.720	0.00	0.1640	5.636	0.00
SINGLE	0.2139	-0.5576	-10.980	0.00	-0.5912	-11.940	0.00
SP	0.3916	-0.2127	-4.811	0.00	-0.2470	-5.798	0.00
KID	0.1431	15.1340	7.689	0.00	16.9270	9.085	0.00
UNEMP	0.2741	-0.1490	-5.494	0.00	-0.1479	-5.463	0.00
HEALTH	0.0843	-0.5626	-12.565	0.00	-0.5593	-12.485	0.00
LEFT	0.1114	-0.1848	-4.899	0.00	-0.1851	-4.909	0.00
ET_1	0.1253	-0.4139	-8.728	0.00	-0.4160	-8.804	0.00
ET_2	0.1670	0.2769	6.637	0.00	0.2934	7.054	0.00
MET	0.0287	1.5059	2.713	0.01	1.5721	2.833	0.00
MET^2	0.0059	-1.8497	-1.308	0.19	-1.8489	-1.305	0.19
B^*	0.9673	-4.4797	-8.474	0.00	-4.9614	-9.913	0.00
UN	0.0830	-19.6270	-14.683	0.00	-16.0420	-14.476	0.00
JAN	0.0833	0.0887	1.626	0.10			
FEB	0.0833	-0.0161	-0.297	0.77			
APR	0.0833	0.0290	0.537	0.59			
MAY	0.0833	-0.0237	-0.441	0.66			
JUNE	0.0833	-0.0299	-0.557	0.58			
JULY	0.0833	0.1541	2.878	0.00			
AUG	0.0833	0.0758	1.425	0.15			
SEP	0.0833	-0.0723	-1.317	0.19			
OCT	0.0833	-0.1259	-2.311	0.02			
NOV	0.0833	-0.0570	-1.061	0.29			
DEC	0.0833	-0.0835	-1.553	0.12			
ρ		0.2380	16.962	0.00	0.2374	16.917	0.00
Log-Likelihood		-18265.59			-18288.12		

Table 4.19 (Continued)

Variable	Specification								
	(3)			(4)			(5)		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value	Coefficient	t-value	p-value
EX[illegible]									
Constant	0.5059	2.693	0.01	0.7288	8.366	0.00	0.7273	8.351	0.00
A24	0.3834	9.893	0.00	0.3835	9.903	0.00	0.3835	9.902	0.00
A2534	0.2630	7.125	0.00	0.2624	7.117	0.00	0.2624	7.113	0.00
A3544	0.1871	5.136	0.00	0.1870	5.139	0.00	0.1868	5.130	0.00
GENDER	0.0215	0.769	0.44	0.0213	0.766	0.44	0.0215	0.772	0.44
ELEM	-0.4260	-3.246	0.00	-0.4269	-3.257	0.00	-0.4268	-3.247	0.00
LHSC	-0.1074	-4.250	0.00	-0.1080	-4.278	0.00	-0.1079	-4.273	0.00
POST	0.2491	8.289	0.00	0.2489	8.284	0.00	0.2490	8.285	0.00
SINGLE	-0.2496	-5.184	0.00	-0.2899	-7.757	0.00	-0.2901	-7.763	0.00
SP	-0.4425	-10.699	0.00	-0.4847	-18.627	0.00	-0.4847	-18.623	0.00
KID	-2.3210	-1.327	0.18						
UNEMP	0.2965	10.683	0.00	0.2965	10.679	0.00	0.2964	10.676	0.00
HEALTH	-0.2955	-7.134	0.00	-0.2958	-7.148	0.00	-0.2957	-7.140	0.00
LEFT	0.2713	7.165	0.00	0.2707	7.150	0.00	0.2708	7.154	0.00
ET_1	-0.4652	-11.949	0.00	-0.4679	-12.025	0.00	-0.4680	-12.029	0.00
ET_2	-0.2129	-5.980	0.00	-0.2148	-6.038	0.00	-0.2147	-6.036	0.00
MET	1.0015	5.000	0.00	1.0019	5.005	0.00	1.0030	5.010	0.00
MET^2									
B^*	0.1725	0.368	0.71	-0.4487	-15.205	0.00	-0.4487	-15.198	0.00
UN	1.6689	1.495	0.13	2.5421	2.840	0.00	2.5585	2.859	0.00
JAN									
FEB									
APR									
MAY									
JUNE									
JULY									
AUG									
SEP									
OCT									
NOV									
DEC									

Table 4.19 (Concluded)

Variable	Specification								
	(3)			(4)			(5)		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value	Coefficient	t-value	p-value
WKS									
Constant	3.1828	15.491	0.00	1.5048	16.735	0.00	3.2377	15.844	0.00
A24	0.2082	5.084	0.00	0.2098	5.136	0.00	0.2092	5.104	0.00
A2534	0.2633	6.566	0.00	0.2679	6.699	0.00	0.2637	6.570	0.00
A3544	0.6152	15.611	0.00	0.6166	15.674	0.00	0.6161	15.624	0.00
GENDER	0.3305	12.130	0.00	0.3271	12.043	0.00	0.3305	12.116	0.00
ELEM	-0.1961	-1.379	0.17	-0.1883	-1.343	0.18	-0.1985	-1.389	0.16
LHSC	-0.1229	-4.732	0.00	-0.1206	-4.665	0.00	-0.1237	-4.759	0.00
POST	0.1641	5.641	0.00	0.1617	5.568	0.00	0.1658	5.694	0.00
SINGLE	-0.5913	-11.945	0.00	-0.2916	-7.886	0.00	-0.5759	-11.642	0.00
SP	-0.2481	-5.826	0.00	0.0615	2.431	0.02	-0.2327	-5.472	0.00
KID	17.0140	9.136	0.00				16.2250	8.726	0.00
UNEMP	-0.1490	-5.505	0.00	-0.1466	-5.434	0.00	-0.1498	-5.526	0.00
HEALTH	-0.5642	-12.623	0.00	-0.5607	-12.594	0.00	-0.5661	-12.677	0.00
LEFT	-0.1895	-5.040	0.00	-0.1859	-4.971	0.00	-0.1893	-5.036	0.00
ET_1	-0.3817	-9.116	0.00	-0.3616	-8.670	0.00	-0.3808	-9.080	0.00
ET_2	0.3280	9.460	0.00	0.3429	9.937	0.00	0.3176	9.141	0.00
MET	0.8432	4.130	0.00	0.8285	4.067	0.00	0.8024	3.923	0.00
MET^2									
B'	-4.9834	-9.961	0.00	-0.4265	-12.828	0.00	-4.7710	-9.554	0.00
UN	-16.0220	-14.459	0.00	-21.8350	-23.589	0.00	-18.0570	-15.150	0.00
JAN							0.0968	2.379	0.02
FEB									
APR									
MAY									
JUNE									
JULY							0.1681	4.239	0.00
AUG									
SEP									
OCT							-0.0967	-2.463	0.01
NOV									
DEC									
ρ	0.2375	16.929	0.00	0.2353	16.800	0.00	0.2380	16.984	0.00
Log-Likelihood	-18289.53			-18334.86			-18275.99		

Table 4.20 LR Test for Welfare Non-Participation and Work Participation

Unrestricted model	Restricted model	LR test	d.f.	$\chi^2_{.05}$
Spec. (1) Lu = −18265.59	Spec. (2) Lr = −18288.12	45.06	22	33.93
Spec. (2) Lu = −18288.12	Spec. (3) Lr = −18289.53	2.82	2	5.99
Spec. (3) Lu = −18289.53	Spec. (4) Lr = −18334.86	90.66	2	5.99
Spec. (5) Lu = −18275.99	Spec. (4) Lr = −18334.86	117.74	5	11.07

CHAPTER 5

CONCLUSIONS

In this thesis, in addition to studying the behaviour of people who use welfare (the demand side), we also focus on the role of welfare administrators (the supply side) in determining welfare participation and non-participation. Their role is important since welfare administrators in each province can use their own discretion to determine who should receive welfare benefits. The impacts of administrative selection and of administrative change have been overlooked in the literature on welfare participation. To understand the full picture of welfare participation in Canada, it is necessary to take these roles into consideration.

An additional contribution of this thesis to the analysis of welfare participation is the use of pooled cross-section time-series data that contain monthly information on welfare status and other variables. Previous studies of welfare participation have used cross-section or pooled cross-section time-series data pertaining to annual income and welfare status. Using annual welfare status data may distort some parameter estimates since individuals who are on welfare for only one month of the year have the same annual welfare status (*e.g.*, "on welfare" in 1989) as individuals who have received welfare throughout the year. Yet, the effects of changes in the monthly benefit rate and the wage rate on the welfare decisions of these two types of individuals could differ substantially. Moreover, using monthly data allows us to calculate whether an individual is eligible for welfare in each month. This is important because welfare is only an option for those individuals who are eligible for welfare. This feature of the welfare system has been overlooked in many previous studies of welfare participation.

A major finding of the thesis is that welfare participation is determined by both the demand (the individual's welfare decision) and supply (selection by welfare administrators) sides and that welfare participation can be affected by administrative changes. In the absence of administrative discretion, the proportion of welfare recipients in Canada who are single persons may have been higher than 57 percent in 1990 and 55 percent in 1997.

In Chapter 3, each individual's monthly earnings and potential welfare benefits are used to compute their monthly welfare eligibility. We found that the monthly welfare take-up rate in Canada, which indicates the percentage of eligible individuals who actually receive welfare in each month, was 9 percent for single persons and 29 percent for single parents in 1989-90. These rates are much lower than the welfare (Aid to Families with Dependent Children) take-up rate in the U.S., which was 68-75 percent in 1986-87 (Blank and Hanratty, 1993, and Blank and Ruggles, 1996).

A major difference in the modelling of welfare participation in this thesis concerns the role of administrative selection. In this framework, as explained in Chapter 3, individual welfare participation does not only depend on the wage rate, the benefit rate, the welfare tax rate, the unemployment rate, province of residence and personal and household characteristics (as in previous studies), but also depends on administrative selection. This type of selection is determined by the indices of an individual's potential well-being and of the administrator's minimum acceptable level of well-being. These indices vary with an individual's past income, personal and household characteristics, and province-related variables such as per-capita income, the ratio of the government deficit to GDP, the unemployment rate and province dummy variables.

Based on estimation of the welfare participation equation using a bivariate probit procedure with partial observability, the results in chapter 3 show that the welfare benefit has a positive effect on the probability of welfare participation while the welfare tax rate and wage rate have a negative effect on the probability of welfare participation. Personal characteristics and an individual's province of residence are also significant factors in determining their welfare participation decision. These findings are consistent with those in previous studies.

As predicted by our model, personal and household characteristics, the individual's past income, provincial per-capita income, the government deficit to GDP ratio, and the unemployment rate are found to determine the administrative selection of individuals for welfare participation. Most importantly, our findings show that administrative selection decisions differ according to family status (*i.e.*, single person or single parent families). For example, we find that provincial per-capita income and the ratio of the government deficit to GDP have a positive impact on a single parent's probability of being selected for welfare, but have a negative impact on a single person's probability of being selected for welfare. These results may imply that welfare administrators are more willing to support single parents during a boom period, while they may expect single persons to find work.

In addition, we have found that an individual's decision to apply for welfare and administrative selection are inter-dependent. During periods in which there are many welfare applicants, welfare administrators may be more selective with respect to single persons, but not with respect to single parents.

When administrative selection is not included in the estimated welfare participation equation, the effect of the welfare benefit on welfare participation always has an unexpected (negative) sign (as also found, for example, by Christofides *et al.* (1997)). This indicates that the omission of administrative selection may lead to incorrect inferences.

When individuals who are ineligible for welfare are included in the data set, we find that increases in the wage rate and the welfare tax rate have larger negative impacts on the probability of applying for welfare. In addition, the effect of an increase in the benefit rate on welfare participation by single parents becomes negative or insignificant.

The empirical study in Chapter 3 is limited because additional control variables (*e.g.*, poverty line measures, and the marginal income tax rate) could not be added to the administrative selection equation. Such control variables may provide a better explanation of the selection decisions made by welfare administrators. This limitation may be the result of using a data set in which only a small proportion of individuals are welfare recipients and which covers only a short time period. In the future, when better data on welfare cases are available, we may be able to improve the robustness of the administrative selection equation.

Our findings in chapter 4 show that age, the level of education and family status are the significant determinants of employment and training (ET) program participation. The results from the estimation of an earnings equation show that the earnings of former and current welfare recipients are determined by current ET program participation, gender, education and whether an individual had a health problem at the time they received welfare benefits. Current ET program participation has a significant negative effect on participants' earnings. However, previous participation in ET programs does not have a significant positive effect on current earnings.

Using a bivariate probit procedure, we also find that current ET program participation has a negative impact on individuals' probabilities of working and staying off welfare. This could be because they have no time to work while participating in ET programs. As a result, they need financial assistance. Individuals who have completed or left ET programs have a higher probability of working, but a lower probability of staying off welfare. This implies that they need to receive welfare benefits to supplement their earnings from work. However, if they spend a longer time participating in ET programs, their probability of being off welfare is higher.

Our results do not show that single persons are more likely to be selected for ET program participation. This may be because single persons choose to leave welfare and enter the labour market when they are asked to develop an employment plan and to participate in an ET program. However, the model developed in Chapter 4 does not consider ET program participation as both an individual choice and the decision of a welfare administrator at the same time. This may be a worthwhile area for further research.

Our final remark concerns the policy implications of our results. To control the cost of welfare, administrative selection decisions may be necessary in a welfare system where a large proportion of people on welfare are working-age single persons who are on welfare because they are unemployed.[1] This selection, however, may not be necessary if welfare programs were designed to assist specific types of individuals. In other words, welfare programs could be designed specifically for needy individuals such as disabled persons, children, senior citizens and widows, and for *temporarily* needy individuals who have exhausted their other sources of income due to no fault of their own. Changes of this type would institutionalize administrative selection and could reduce administrative discretion. Therefore, with a minimum degree of administrative discretion and more specific design of welfare programs, needy individuals will be certain to receive social assistance, and taxpayers will be certain that they are supporting people who are really in need.

In addition, the 1993 welfare reforms in Alberta may be a good example for the other provinces in Canada since they increased the likelihood of welfare recipients becoming employed. Even though the reforms did not improve welfare recipients' earnings, they may have helped them gain more self-sufficiency and self-esteem.

---

[1] In 1997, about 45 percent of welfare recipients in Canada were on welfare because they had job related problems (National Council of Welfare, 1998).

BIBLIOGRAPHY

Abowd, John M. and Henry S. Farber (1982). "Job Queues and the Union Status of Workers." *Industrial and Labor Relations Review* 35(3):354-367.

Alberta Family and Social Services (1993/94, 1994/95, 1995/96, 1996/97). *Annual Report*. Edmonton: Alberta Family and Social Services.

(1996). *Alberta Welfare Reforms Progress Report: March 1993-December 1995*. Edmonton: Alberta Family and Social Services.

Allen, Douglas W. (1993). "Welfare and the Family: The Canadian Experience." *Journal of Labor Economics* 11(1):S201-S223.

Ashenfelter, Orley (1978). "Estimating the Effect of Training Programs on Earnings." *Review of Economics and Statistics* 6(1):47-57.

Ashenfelter, Orley and David Card (1985). "Using the Longitudinal Structure of Earnings to Estimate the Effect of Training Programs." *Review of Economics and Statistics* 67(4):648-660.

Barnow, Burt S., Glen G. Cain and Arthur S. Goldberger (1980). "Issues in the Analysis of Selectivity Bias." in W. E. Stromsdorfer and G. Farkas (eds.), *Evaluation Studies Review Annual, Vol. 5,* pp. 43-59. Beverly Hills: Sage Publications.

Barrett, Garry F. (1996). "The Dynamic Behaviour of Income Assistance Recipients in British Columbia." Ph.D. Dissertation. University of British Columbia.

Barrett, Garry F. and Michael I. Cragg (1998). "An Untold Story: the Characteristics of Welfare Use in British Columbia." *Canadian Journal of Economics* 31(1):165-188.

Bassi, Laurie J. (1990). "Employment and Welfare Participation among Women." *Economic Inquiry* 28(2):222-238.

Bingley, Paul and Ian Walker (1997). "The Labour Supply, Unemployment and Participation of Lone Mothers in In-Work Transfer Programs." *Economic Journal* 107(444):1375-1390.

Blank, Rebecca M. (1985). "The Impact of State Economic Differentials on Household Welfare and Labor Force Behavior." *Journal of Public Economics* 28(1):25-58.

Blank, Rebecca M. (1989). "Analyzing the Length of Welfare Spells." *Journal of Public Economics* 39(3):245-273.

Blank, Rebecca M. (1997). "What Causes Public Assistance Caseloads to Grow?" NBER Working Paper no. 6343. National Bureau of Economic Research.

Blank, Rebecca M. and Maria J. Hanratty (1993). "Responding to Need: A Comparison of Social Safety Nets in Canada and the United States." in David Card and Richard B. Freeman (eds.), *Small Differences that Matter: Labor Markets and Income Maintenance in Canada and the United States*, pp. 191-231. Chicago: University of Chicago Press.

Blank, Rebecca M. and Patricia Ruggles (1994). "Short-Term Recidivism among Public Assistance Recipients." *American Economic Review* 84(2):49-53.

(1996). "When Do Women Use Aid to Families with Dependent Children and Food Stamps?" *Journal of Human Resources* 31(1):57-89.

Boessenkool, Kenneth J. (1997). "Back to Work: Learning from the Alberta Welfare Experiment." A Commentary. C. D. Howe Institute.

Boyes, William J., Dennis L. Hoffman and Stuart A. Low (1989). "An Econometric Analysis of the Bank Credit Scoring Problem." *Journal of Econometrics* 40(1):3-14.

British Columbia Ministry of Social Services (1992). *Routes to Independence: The Effectiveness of Employment and Training Programs for Income Assistance Recipients in British Columbia.* Vancouver: B.C. Ministry of Social Services.

Brown, David M. (1995). "Welfare Caseload Trends in Canada." in J. Richards and W. G. Watson (eds.), *Helping the Poor: A Qualified Case for "Workfare,"* pp. 37-90. Toronto: C. D. Howe Institute.

Bruce, Rob, Nick Bailey, John Cragg, Alice Nakamura and Bill Warburton (1993). "Those Returning to Income Assistance, the UI Connection, and Training." paper presented at the CERF Conference on Income Support, Ottawa.

Canada West Foundation (1997). *Where Are They Now?: Assessing the Impact of Welfare Reform on Former Recipients, 1993-1996.* Edmonton: Canada West Foundation.

Canadian Tax Foundation (1987/88, 1988/89, 1990). *The National Finances.* Toronto: Canadian Tax Foundation.

Card, David, Philip K. Robins, Tod Mijanovich and Winston Lin (1996). *Do Financial Incentives Encourage Welfare Recipients to Work?: Initial 18-Month Findings from the Self-Sufficiency Project.* Vancouver: Social Research and Demonstration Corporation.

Charette, Michael and Ronald Meng (1994). "The Determinants of Welfare Participation of Female Heads of Household in Canada." *Canadian Journal of Economics* 27(2), 290-306

Christofides, Louis N., Thanasis Stengos and Robert Swidinsky (1997). "Welfare Participation and Labour Market Behaviour in Canada." *Canadian Journal of Economics* 30(3):595-621.

Clark, Christopher (1995). "Work and Welfare: Looking at Both Sides of the Equation." *Perception* 19:21-24.

Dooley, Martin D. (1996). "The Evolution of Welfare Participation Among Canadian Lone Mothers From 1973-1991." Working Paper no. 96-02. Department of Economics, McMaster University.

Ellwood, David T. and Mary Jo Bane (1985). "The Impact of AFDC on Family Structure and Living Arrangements." in Ronald G. Ehrenberg (ed.), *Research in Labor Economics,* pp. 137-207. Greenwich, CN: JAI Press.

Fortin, Bernard and Guy Lacroix (1997). "Welfare Benefits, Minimum Wage Rate and the Duration of Welfare Spells: Evidence from a Natural Experiment in Canada." Working Paper no. 97-08. Department of Economics, Université Laval.

Friedlander, Daniel, David H. Greenberg and Philip K. Robins (1997). "Evaluating Government Training Programs for the Economically Disadvantaged." *Journal of Economic Literature* 34(4):1809-1855.

Friedlander, Daniel and Philip K. Robins (1995). "Evaluating Program Evaluations: New Evidence on Commonly Used Nonexperimental Methods." *American Economic Review* 85(4):923-937.

Greene, William H. (1993). *Econometric Analysis (Third Edition).* New Jersey: Prentice-Hall.

Harris, Kathleen M. (1993). "Work and Welfare among Single Mothers in Poverty." *American Journal of Sociology* 99(2):317-352.

Hausman, Jerry A. (1980). "The Effect o Wages, Taxes, and Fixed Costs on Women's Labor Force Participation." *Journal of Public Economics* 14(2):161-194.

Haveman, Robert and Barbara Wolfe (1998). "Welfare to Work in the U.S.: A Model for Other Nations?" Discussion Paper no. 1159-98. Institute for Research on Poverty, University of Wisconsin-Madison.

Heckman, James J. (1979). "Sample Selection Bias as a Specification Error." *Econometrica* 47(1):153-161.

Heckman, James J. (1992). "Randomization and Social Policy Evaluation." in Charles F. Manski and Irwin Garfinkel (eds.), *Evaluating Welfare and Training Programs*, pp. 201-230. Cambridge: Harvard University Press.

Heckman, James J. and Burton Singer (1984). "Econometric Duration Analysis." *Journal of Econometrics* 24(1-2):63-132.

Heffernan, Jr., W. Joseph (1973). "Variations in Negative Tax Rates in Current Public Assistance Programs: An Example of Administrative Discretion." *The Journal of Human Resources* 8:56-89.

Heywood, John S. and Madhu S. Mohanty (1993). "Testing for State and Local Government Job Queues." *Journal of Labor Research* 14(4):455-467.

(1995). "Estimation of the US Federal Job Queue in the Presence of an Endogenous Union Queue." *Economica* 62(248):479-93.

Hotz, V. Joseph (1992). "Designing an Evaluation of the Job Training Partnership Act."

in Charles F. Manski and Irwin Garfinkel (eds.), *Evaluating Welfare and Training Programs*, pp. 76-114 Cambridge: Harvard University Press.

Hoynes, Hilary W. (1996). "Local Labor Markets and Welfare Spells: Do Demand Conditions Matter?" NBER Working Paper 5644. National Bureau of Economic Research.

Hoynes, Hilary W. and Thomas McCurdy (1994). "Has the Decline in Benefits Shortened Welfare Spells?" *American Economic Review* 84(2):43-48.

Huang, Shaomin and N. Scott Cardell (1996). "Duration Analysis on Multiple Welfare Spells: A Repeated Hazard Model with Heterogeneity." Working Paper. Department of Economics, Washington State University.

Human Resources Development Canada (1994). *Inventory of Income Security Programs in Canada*. Ottawa: Minister of Supply and Services.

Kalbfleisch, John D. and Robert L. Prentice (1980). *The Statistical Analysis of Failure Time Data*. New York: John Wiley & Sons.

Keane, Michael and Robert Moffitt A. (1998). "A Structural Model of Multiple Welfare Program Participation and Labor Supply." *International Economic Review* 39(3):553-589.

Kiefer, Nicholas M. (1988). "Economic Duration Data and Hazard Functions." *Journal of Economic Literature* 26(2):646-679.

Maddala, G. S. (1983). *Limited-Dependent and Qualitative Variables in Econometrics.* New York: Cambridge University Press.

Milne, William J. (1995). "Revising Income Assistance Programs in New Brunswick: A Look at the Demonstration Projects." in J. Richards and W. G. Watson (eds.), *Helping the Poor: A Qualified Case for "Workfare,"* pp. 121-150. Toronto: C. D. Howe Institute.

Moffitt, Robert A. (1983). "An Economic Model of Welfare Stigma." *American Economic Review* 73(5):1023-1035.

Moffitt, Robert A. (1992). "Incentive Effects of the U.S. Welfare System: A Review." *Journal of Economic Literature* 30:1-61.

Moffitt, Robert A. (1996). "The Effect of Employment and Training Programs on Entry and Exit from the Welfare Caseload." *Journal of Policy Analysis and Management* 15(1):32-50.

National Council of Welfare (1987). *Welfare in Canada: The Tangled Safety Net.* Ottawa: Minister of Supply and Services.

(1989, 1990, 1991a, 1992, 1993a, 1994, 1995a, 1996, 1997). *Welfare Incomes.* Ottawa: Ministry of Supply and Services.

(1991b). *The Canada Assistance Plan: No Time for Cuts.* Ottawa: Minister of Supply and Services.

(1993b). *Incentives and Disincentives to Work.* Ottawa: Minister of Supply and Services.

(1995b). *The 1995 Budget and Block Funding.* Ottawa: Minister of Supply and Services.

(1998). *Profiles of Welfare: Myths and Realities.* Ottawa: Ministry of Public Works and Government Services.

O'Neill, June A., Laurie J. Bassi and Douglas A. Wolf (1987). "The Duration of Welfare Spells." *Review of Economics and Statistics* 69(2):241-248.

Osberg, Lars and Shelley Phipps (1993). "Labour Supply with Quantity Constraints: Estimates from a Large Sample of Canadian Workers." *Oxford Economic Papers* 45(2):269-291.

Poirier, Dale J. (1980). "Partial Observability in Bivariate Probit Models." *Journal of Econometrics* 12(2):209-217.

Sandefur, Gary D. and Steven T. Cook (1997). "Duration of Public Assistance Receipt: Is Welfare a Trap?." Discussion Paper no. 1129-97. Institute for Research on Poverty, University of Wisconsin-Madison.

Shillington, Richard (1998). "Social Assistance and Paid Employment in Alberta, 1993-1996." Population Research Laboratory, Department of Sociology, University of Alberta.

Smith, Patricia K. (1993). "Welfare as a Cause of Poverty: A Time Series Analysis." *Public Choice* 75(2):157-170.

Smith, Paul A. (1997). "The Effect of the 1981 Welfare Reforms on AFDC Participation and Labor Supply." Discussion Paper no. 1117-97. Institute for Research on Poverty, University of Wisconsin-Madison.

Social Research and Demonstration Corporation (1996). *When Work Pays Better Than Welfare: A Summary of the Self-Sufficiency Project's Implementation, Focus Group, and Initial 18-Month Impact Reports.* Vancouver: Social Research and Demonstration Corporation.

Statistics Canada, Household Survey Division, Special Survey Group (1990). *Labour Market Activity Survey 1988-1989-1990 (CD-ROM).* Ottawa: Statistics Canada.

Statistics Canada, Household Survey Division (1986). *Income (1983) Assets and Debts (1984) of Economic Families and Unattached Individuals (Microdata Tape).* Ottawa: Statistics Canada.

Ziliak, James P., David N. Figlio, Elizabeth E. Davis and Laura S. Connolly (1997). "Accounting for the Decline in AFDC Caseloads: Welfare Reform or Economic Growth?" Discussion Paper no. 1151-97. Institute for Research on Poverty, University of Wisconsin-Madison.

APPENDIX A

WELFARE CASELOADS BY PROVINCE

Table A.1 Welfare Recipients[1] by Province and as Percentage of Population[2]

YEAR	Nfld.	PEI	NS	NB	Que.	Ont.	Man.	Sask.
1971	91852	10552	45593	65756	489073	364046	75763	68338
1972	80574	15913	52278	61717	462571	333584	78544	69604
1973	70912	7238	52864	58575	406452	307880	70427	56728
1974	63250	7291	47597	51879	395820	317283	60681	44405
1975	63127	8401	52358	55604	416558	336415	56616	45332
1976	61009	8812	54160	52521	428713	367943	57574	43490
1977	52424	8685	55932	67130	457053	338909	55251	38807
1978	53813	8329	49762	63432	464503	356324	52489	41363
1979	39312	8480	50055	65040	478277	382224	47596	42130
1980	48500	9367	51220	66812	511925	354798	45600	41390
1981	50400	10100	62400	67400	532900	389800	48900	43800
1982	54700	11300	64600	62700	561900	406800	47800	48400
1983	51900	11300	69000	70100	675800	471200	55900	59700
1984	53300	9800	67500	68600	705900	484600	59200	63700
1985	49100	9600	73600	69100	708700	485800	62800	64000
1986	47000	9200	72100	68800	693900	485800	62600	62700
1987	50500	9300	73000	73700	649600	518400	60600	62100
1988	47900	8900	73800	70600	594000	533500	62700	60300
1989	44800	8300	75600	67700	559300	588200	63000	57200
1990	47900	8600	78400	67200	555900	675700	66900	54100
1991	51800	10300	86200	71900	594900	929900	71700	53400
1992	59800	11800	92600	78200	674900	1184700	80900	60400
1993	68100	12600	98700	78100	741400	1287000	88000	68200
1994	67400	13100	104000	73500	787200	1379300	89300	81000
1995	71300	12400	104000	67400	802200	1344600	85200	82200
1996	72000	11700	103100	67100	813200	1214600	85800	80600
1997	71900	11100	93700	70600	793300	1149000	79100	79700
1998	64600	10900	85500	67100	725700	1091300	72700	72500

Table A.1 (Concluded)

Year	Alta.	BC	Yukon	NWT	Canada	Population (1,000,000)	Canada as % of Population
1971	93960	154851	280	n.a.	1460064	22.04	6.625
1972	88983	134198	1291	n.a.	1379257	22.29	6.188
1973	85456	103989	892	n.a.	1221413	22.57	5.412
1974	80609	137192	2622	n.a.	1208629	22.91	5.276
1975	77970	162349	5711	n.a.	1280441	23.24	5.510
1976	78220	162076	8400	n.a.	1322918	23.53	5.622
1977	86464	162000	5329	n.a.	1327984	23.80	5.580
1978	85060	140962	5639	n.a.	1321676	24.03	5.500
1979	80823	146940	6303	n.a.	1347180	24.28	5.549
1980	76105	122848	1075	5190	1334830	24.60	5.426
1981	78100	128000	1200	7400	1420400	24.92	5.700
1982	91700	144900	1500	6500	1502800	25.20	5.963
1983	130600	228800	1300	7300	1832900	25.43	7.208
1984	117100	257100	1100	7000	1894900	25.68	7.379
1985	124100	267600	1500	7400	1923300	25.91	7.423
1986	126600	255700	1400	7100	1892900	26.20	7.225
1987	150500	247700	1200	8300	1904900	26.55	7.175
1988	149800	241100	1100	9300	1853000	26.94	6.878
1989	151700	230000	900	9400	1856100	27.41	6.772
1990	148800	216000	1000	9600	1930100	27.82	6.938
1991	156600	244000	1200	10300	2282200	28.13	8.113
1992	188300	279300	1700	10400	2723000	28.48	9.561
1993	196000	323300	2500	11100	2975000	28.81	10.326
1994	138500	353500	2400	11000	3100200	29.14	10.639
1995	113200	374300	2100	12000	3070900	29.45	10.428
1996	105600	369900	1700	11800	2937100	29.78	9.863
1997	89800	321300	2000	12800	2774300	30.11	9.214
1998	77000	297400	2100	10700	2577500	30.39	8.481

Source: [1] Human Resources Development Canada.
[2] CANSIM (Label D1).

Table A.2 Welfare Caseloads and Labour Market Data

YEAR	Nfld.	PEI	NS	NB	Que.	Ont.	Man.	Sask.
1981	20400	4500	27700	29600	302300	203100	23600	22600
1982	22000	4900	29200	29700	325400	214900	24100	23600
1983	22900	5000	31400	35000	396800	253100	29000	29500
1984	21800	4400	32200	35100	415300	261500	31100	31400
1985	20900	4300	34300	35400	424400	264900	33100	31600
1986	19700	4400	35300	35800	416100	266400	33000	30800
1987	21400	4500	35600	36400	390100	283400	33200	30500
1988	20300	4400	36600	35400	357900	288200	34300	29900
1989	19600	4200	38100	34600	340700	314400	34500	28000
1990	21700	4300	39600	34800	343900	349200	36800	26800
1991	23500	5100	44000	37800	366200	474900	39400	26700
1992	25600	5700	46800	41500	413400	600800	45600	30500
1993	32200	6200	50200	42100	450700	656900	49800	35000
1994	35400	6400	53100	40000	473000	696800	50400	40200
1995	35400	6100	53200	36500	479400	678400	48000	40400
1996	36000	5800	52900	35500	483100	611900	46200	39800
1997	36000	5600	48400	36200	470400	578300	41800	39100
1998	32300	5600	44300	34300	439300	549800	38700	36100

Year	Alta.	BC	Yukon	NWT	Canada	UNEM rate	LF (1,000)	EMP (1,000)	EMP as % of LF
1981	31500	66300	2700	n.a.	734300	7.6	12331	11397	92.43
1982	36300	75200	2800	n.a.	788100	11.1	12415	11042	88.94
1983	51500	127900	700	2200	985000	11.9	12604	11104	88.10
1984	47000	146000	600	2100	1028500	11.3	12853	11401	88.70
1985	52600	153400	800	2300	1058000	10.5	13123	11742	89.48
1986	57000	147600	600	2200	1048900	9.6	13376	12093	90.41
1987	71200	142300	500	2600	1051700	8.8	13627	12422	91.16
1988	69900	138000	500	3000	1018400	7.8	13899	12819	92.23
1989	71200	133000	500	3200	1022000	7.5	14148	13086	92.49
1990	69300	125700	500	3400	1056000	8.2	14332	13164	91.85
1991	72500	144500	600	3800	1239000	10.4	14409	12915	89.63
1992	89600	167700	1000	3700	1471900	11.3	14483	12841	88.66
1993	93600	193800	1400	4300	1616200	11.2	14665	13016	88.76
1994	64500	210400	1300	4400	1675900	10.4	14827	13291	89.64
1995	54100	221800	1100	4800	1659200	9.5	14926	13507	90.49
1996	50500	214700	1000	4600	1582000	9.7	15146	13675	90.29
1997	41700	191200	1100	4900	1494700	9.2	15346	13936	90.81
1998	36000	179700	1100	4400	1401600	8.3	15628	14324	91.66

Source: The number of Welfare Caseloads is from Human Resources Development Canada. The unemployment rate (UNEM), labour force (LF) and employment (EMP) data are from CANSIM (labels D980745, D980562 and D980595, respectively).

Table A.3 The Welfare Benefit by Province

	1989	1990	1991	1992	1993	1994	1995	1996
Newfoundland								
Single Employable	3726	3884	4036	4301	4326	4326	4326	2502
Disabled Person	6006	6288	6472	6773	6810	6810	6810	6810
Single Parent, One Child	9486	9928	10596	11198	11262	11262	11262	11262
Couple, Two children	10974	11480	11728	12119	12186	12186	12186	12186
Prince Edward Island								
Single Employable	6942	7245	7644	7872	7956	7160	5635	5245
Disabled Person	6999	7305	7644	7872	7956	7860	7706	7956
Single Parent, One Child	9570	10113	10590	10920	11052	10860	10564	10242
Couple, Two children	14079	14769	15690	16128	16296	16008	15688	14698
Nova Scotia								
Single Employable	5880	5882	5904	5904	5904	5904	5904	5922
Disabled Person	7740	8064	8388	8400	8400	8568	8568	8568
Single Parent, One Child	9408	9792	10212	10368	10368	10560	10560	10560
Couple, Two children	11928	11950	12192	12392	12432	12432	12432	13602
New Brunswick								
Single Employable	2812	2904	3000	3048	3060	3084	3096	3132
Disabled Person	5568	5804	5992	6120	6212	6296	6408	6483
Single Parent, One Child	7624	7868	8120	8304	8480	8844	8576	8673
Couple, Two children	8248	8500	8888	9318	9512	9876	9608	9711
Quebec								
Single Employable	4085	6624	5736	5844	5964	6000	6000	6000
Disabled Person	6319	6872	7464	7656	7788	8088	8088	8268
Single Parent, One Child	8583	9096	8352	9540	9732	10200	10200	10200
Couple, Two children	11977	13188	11328	11652	11880	12000	12000	12000
Ontario								
Single Employable	5892	6804	7416	7812	7935	7956	7527	6240
Disabled Person	8736	9816	10632	10992	11133	11160	11160	11160
Single Parent, One Child	10806	12780	13884	14376	14613	14652	13860	11484
Couple, Two children	13401	16548	17952	18576	18858	18723	17583	14568
Manitoba								
Single Employable	5320	5678	5937	6177	6311	5914	5914	5539
Disabled Person	5720	5947	6205	7951	7206	7157	7157	7157
Single Parent, One Child	7887	8200	8545	9721	9697	9636	9636	9636
Couple, Two children	13283	14383	15282	16044	15615	16103	16103	14640
Saskatchewan								
Single Employable	4860	4980	5100	5375	5760	5760	5760	5760
Disabled Person	7620	7740	7860	7710	7500	7500	7500	7500
Single Parent, One Child	9927	10110	10273	10311	10381	10381	10381	10381
Couple, Two children	13614	13860	14066	14523	14583	14640	14640	14643

Table A.3 (Concluded)

	1989	1990	1991	1992	1993	1994	1995	1996
Alberta								
Single Employable	4803	4803	5514	5640	5412	4728	4728	4728
Disabled Person	5940	5940	6603	6660	6582	6348	6348	6348
Single Parent, One Child	9006	9006	9977	10104	9876	9192	9192	9192
Couple, Two children	13269	13269	15442	15696	15390	14472	14472	14472
British Columbia								
Single Employable	5388	5776	6000	6275	6410	6530	6552	6046
Disabled Person	7446	8076	8328	8823	9044	9220	9252	9252
Single Parent, One Child	9714	10294	10644	11293	11539	11746	11784	11166
Couple, Two children	12072	12743	13128	14206	14546	14818	14868	13632

Source: National Council of Welfare

Table A.4 Consumer Price Indices for All Items (1986 = 100)

	1989	1990	1991	1992	1993	1994	1995	1996
Nfld. (P801000)	109.1	113.8	120.8	122.1	124.1	125.7	127.5	129.5
PEI (P802000)	111.5	117.1	125.9	126.9	129.3	129.0	131.1	133.5
NS (P803000)	111.9	117.5	124.7	125.5	127.0	128.5	130.2	132.5
NB (P804000)	111.5	116.6	124.2	125.0	126.6	127.3	129.2	131.2
Que. (P805000)	112.9	117.7	126.4	128.7	130.5	128.7	131.0	133.1
Ont. (P806000)	116.4	122.0	127.6	129.0	131.2	131.3	134.5	136.6
Man. (P807000)	113.7	118.9	125.0	126.8	130.2	132.0	135.5	138.5
Sask. (808000)	114.4	119.5	125.7	127.0	130.8	133.2	135.8	138.3
Alta. (P809000)	111.3	117.7	124.6	126.4	127.9	129.7	132.7	135.6
BC (P810000)	111.5	117.6	123.8	127.2	131.6	134.2	137.3	138.5

Source: CANSIM.
Note: CANSIM label number in parentheses.

Table A.5 Welfare Recipients in Quebec, Ontario, Alberta and British Columbia

Year	# of Welfare Recipient[1]				Population[2]			
	Que.	Ont.	Alta.	BC	Que.	Ont.	Alta.	BC
1971	489073	364046	93960	154851	6137368	7849002	1665717	2240472
1972	462571	333584	88983	134198	6175026	7963125	1694090	2302085
1973	406452	307880	85456	103989	6214706	8075533	1725327	2367272
1974	395820	317283	80609	137192	6268986	8204240	1754622	2442581
1975	416558	336415	77970	162349	6329619	8319738	1808690	2499569
1976	428713	367943	78220	162076	6396735	8413808	1869302	2533793
1977	457053	338909	86464	162000	6432063	8505712	1947671	2569720
1978	464503	356324	85060	140962	6441162	8591763	2021798	2614033
1979	478277	382224	80823	146940	6467259	8662719	2097606	2663041
1980	511925	354798	76105	122848	6507384	8745308	2192418	2743256
1981	532900	389800	78100	128000	6547704	8811311	2294193	2823930
1982	561900	406800	91700	144900	6579273	8922306	2368249	2872929
1983	675800	471200	130600	228800	6602294	9041710	2390378	2905490
1984	705900	484600	117100	257100	6631173	9171916	2390064	2945634
1985	708700	485800	124100	267600	6665675	9297497	2402928	2974262
1986	693900	485800	126600	255700	6708352	9437835	2430857	3004074
1987	649600	518400	150500	247700	6782819	9644881	2435416	3050141
1988	594000	533500	149800	241100	6839604	9843768	2454715	3115665
1989	559300	588200	151700	230000	6929509	10109780	2495799	3198547
1990	555900	675700	148800	216000	7004436	10299571	2547636	3291379
1991	594900	929900	156600	244000	7064735	10427621	2592551	3373399
1992	674900	1184700	188300	279300	7112810	10570475	2634361	3470307
1993	741400	1287000	196000	323300	7165199	10690447	2670726	3571525
1994	787200	1379300	138500	353500	7207302	10827501	2704904	3681750
1995	802200	1344600	113200	374300	7241429	10964925	2739853	3784008
1996	813200	1214600	105600	369900	7274019	11100876	2780639	3882043
1997	793300	1149000	89800	321300	7308051	11263580	2838643	3961633
1998	725700	1091300	77000	297400	7334502	11413653	2914539	4008951

Source: [1] Human Resources Development Canada.
[2] CANSIM (labels C893858, C894176, C895130 and C895448).

APPENDIX B

WELFARE BENEFIT AND ELIGIBILITY

B.1 Monthly Welfare Benefit

Monthly benefit rates in 1989 and 1990 for all provinces are calculated using two sources of information: the report *Welfare Incomes* and a worksheet of the monthly benefit rate in 1995 (computed by the National Council of Welfare).[1] The National Council of Welfare reports the annual benefit rates in *Welfare Incomes* during 1989-95. Each of these reports contains footnotes indicating the dates when benefit rates have been changed. This information allows the 1989 monthly benefit rates to be calculated by tracking back from 1995 to 1989. The monthly rates from January 1989 to June 1990 (the period covered by the empirical studies in Chapter 3) are shown in Tables B.1 and B.2.

The benefit rates for single parents vary with the number of children. However, the rates provided by the National Council of Welfare are the rates for single parents with one child. The rates for single parents with more than one child in this thesis are calculated as follows:

Benefit for a single parent family = (benefit rate in Table B.2) + (number of children − 1) × (benefit rate in Table B.2 − benefit rate in Table B.1).

B.2 Welfare Eligibility

Welfare eligibility is a non-trivial issue in studying welfare participation since such participation is always conditioned on eligibility. Individuals who want to receive

[1] I would like to thank Steve Kerstetter at the Nation Council of Welfare for providing the detailed calculation for monthly benefit rates in 1995.

social assistance must satisfy certain regulations to be eligible. Because of these eligibility requirements, individuals cannot simply choose welfare as an alternative to work. Therefore, it is essential to understand how welfare eligibility is determined.

The administrative regulations that determine welfare access vary across provinces since the Constitution Act 1982 allows each province in Canada to design, administer and deliver its own social assistance program (Human Resources Development Canada, 1994). The social assistance legislation provides certain basic administrative requirements and general rules to determine an applicant's initial eligibility.

The general rules for all provinces are that applicants must be between 18 and 65 years of age, disabled individuals require medical certification of their condition, full-time students may be qualified if they meet stringent conditions, and strikers are not eligible. However, these administrative rules are augmented by discretionary powers which cannot be observed in any published data. Persons under age 18, for example, may be eligible for social assistance if the Director determines that their home is not suitable for their care and development.

To apply for welfare, an individual has to submit a completed application to an appropriate authority and provide any evidence required in support of the application for assistance, such as proof of age, and bank statements. The applicant must provide written permission to the administering authority to allow verification of any statement made in the application and any supporting documents concerning financial resources, and must agree to report any change in circumstances that might affect their eligibility.

When the administrative conditions are met, the applicants' assets and incomes and budgetary needs are estimated for the "needs test." The needs test takes into account the budget required to attain a minimum standard of living, and the assets and income available to the applicant to meet this minimum standard of living. The needs test comprises an asset test and an income test. The definitions of asset, income and budgetary needs vary across jurisdictions and are listed in Table B.3.

i) Asset Test

In all provinces, assets are composed of fixed and liquid assets. Fixed assets include property, equipment, and household effects. In most provinces, fixed assets such as an individual's principal home, furniture and clothing are exempt. Non-exempt fixed assets are converted into *potential liquid assets*. *Liquid assets* refer to cash, bonds, money held in a trust fund and, for some provinces, the cash surrender value of life insurance. Certain amounts of *potential liquid assets* and *liquid assets* are exempt (*e.g.*, \$100 for an employable family in Newfoundland). The amount of assets in excess of the exempt level (called non-exempt assets) is deemed to be available for the applicants' current maintenance. The applicant must exhaust their non-exempt assets to become eligible for social assistance. For example, employable families in Newfoundland who have more than \$100 in potential liquid assets and liquid assets are not eligible for welfare.

ii) Income Test

Once a household's assets have been determined to be within the limit allowed, the household's financial resources (which belong to the applicant as well as other members of the applicant's household) are examined in order to calculate the level of social assistance to which the applicant is entitled. The assistance is granted on the basis of a budgetary deficit. The deficit occurs when the regularly recurring budgetary needs exceed all available financial resources net of deductions. Budgetary needs include expenditure for food, clothing, shelter, utilities, and personal and household needs. These budgetary needs are defined to be the benefit rates shown in Tables B.1 and B.2. A household's financial resources net of deductions (net earnings) include earnings less statutory deductions and the earnings exemption that varies with household type and employability status (Table B.4).

The definition of financial resources net of deductions (or net earnings) varies across provinces (Table B.3). For example, Newfoundland, Prince Edward Island, New Brunswick, Quebec, Ontario, and British Columbia allow statutory deductions and the earnings exemption from financial resources or gross earnings. The resulting net earnings level is then compared to the household's budgetary needs. Households with a budgetary deficit are eligible for welfare. In contrast, in Nova Scotia, Manitoba, Saskatchewan and Alberta, the monthly earnings exemption is not deducted from gross earnings for new applicants. However, after spending a month on welfare, the earnings exemption is deducted from the gross earnings to calculate net earnings. Saskatchewan does not deduct the earnings exemption from the gross earnings unless the welfare recipient has been on welfare for three months.

The budget deficit assessment can be illustrated by the following example. Suppose that Mr. John, who is a single person, applies for the social assistance in Alberta. He has $40 in cash (which is lower than the exempt level, Table B.3) and has no other income. The welfare benefit for a single person in Alberta is \$400.25 per month.[2] Mr. John is entitled to \$360.25 (which is \$400.25 – \$40) in social assistance if he meets all the administrative conditions. Suppose Mr. John gets a job after a month on welfare and his earnings net of statutory deductions are \$120 a month. Some other work-related deductions may be allowed depending upon the decisions of welfare administrators. With no other deductions, his income in excess of \$115 is clawed back by 50 percent. His clawback is \$42.50 (which is (0.5)(120 – 115) + 40).[3] Therefore, after getting a job, Mr. John's total income is \$472.75 which is (400.25 + 115 – 0.5(120 – 115) – 40). If Mr. John's total net earnings (given that he still has \$40 of unearned income) exceed \$569.72,[4] he will be ineligible for welfare since his net financial resources exceed the welfare benefit plus the earnings exemption.

iii) A Calculation of Welfare Eligibility in Chapter 3

Welfare eligibility is calculated by the income test only, rather than the income and asset tests since we do not have data on a household's assets. The income test can be performed by comparing a household's monthly clawback with the monthly schedule benefit rate. A household whose monthly clawback exceeds the benefit rate is not eligible for welfare. On the other hand, a household whose monthly clawback is less than the benefit rate is eligible for welfare.

---

[2] This is the benefit rate before October 1993.

[3] Given that he still has \$40 of unearned income.

[4] This is from the following inequality: $\text{income} > 400.25 + 115 + 0.5 \times (200 - 115) + 0.25 \times (300 - 200) + 0.1 \times (\text{income} - 300) - 40$.

Table B.5 shows the calculation of the benefit payment by province. The benefit payment is the schedule benefit rate (from Tables B.1 and B.2) minus clawback (which is calculated using household earnings and the earned income exemption from Table B.4). A household is eligible for welfare if and only if its benefit payment (B_i) is positive.

In Nova Scotia, Manitoba, Saskatchewan and Alberta, the earned income exemption is not taken into account when calculating initial eligibility for new applicants.[5] Therefore, the benefits payment levels in Table B.5 are used to calculate monthly eligibility for recipients who have been on welfare for at least one month. New applicants in these provinces are only eligible if their households' income is below the schedule benefit rate.

Table B.6 show the results of the eligibility calculation. There are 2,600 single persons, so that with 17 monthly observations on each (as described in Appendix C), there are 44,200 monthly observations for single persons.[6] In addition, there are 1,005 single parents, implying 17,085 monthly observations for single parents.[7] Of these monthly observations, 12,993 observations in the sample of single persons and 13,652 observations in the sample of single parents refer to households that are eligible for welfare.

[5] New recipients in Saskatchewan are not entitled to an earnings exemption for the first three months. However, when calculating eligibility for an individual in Saskatchewan, we use the same rule as used in Nova Scotia, Manitoba and Alberta. This is because we do not know the welfare duration in this data set.

[6] Two hundred and ninety-five single persons are deleted from the sample since they belong to multi-person households.

[7] Nineteen single parents (323 observations) who have no children are deleted from the sample.

Table B.1 Provincial Benefit Rates for Single Persons

	Nfld.	PEI	NS	NB	Que.	Ont.	Man.	Sask.	Alta.	BC
1989	**3726**	**6942**	**5880**	**2812**	**4085**	**5892**	**5320**	**4860**	**4803**	**5388**
Jan.	306	584.5	490	232	189.3	491	435.1	405	400.25	430
Feb.	306	584.5	490	232	189.3	491	435.1	405	400.25	430
March	306	584.5	490	232	189.3	491	435.1	405	400.25	430
Apr.	306	584.5	490	232	189.3	491	435.1	405	400.25	430
May	306	584.5	490	232	189.3	491	435.1	405	400.25	430
June	306	584.5	490	232	189.3	491	435.1	405	400.25	430
July	315	572.5	490	232	189.3	491	435.1	405	400.25	468
Aug.	315	572.5	490	232	552	491	435.1	405	400.25	468
Sept.	315	572.5	490	239	552	491	435.1	405	400.25	468
Oct.	315	572.5	490	239	552	491	468.03	405	400.25	468
Nov.	315	572.5	490	239	552	491	468.03	405	400.25	468
Dec.	315	572.5	490	239	552	491	468.03	405	400.25	468
1990	**3884**	**7245**	**5880**	**2904**	**6624**	**6804**	**5678**	**4980**	**4803**	**5776**
Jan.	315	572.5	490	239	552	567	468.03	405	400.25	468
Feb.	315	572.5	490	239	552	567	468.03	405	400.25	468
March	315	572.5	490	239	552	567	468.03	405	400.25	468
Apr.	315	592.5	490	239	552	567	468.03	405	400.25	468
May	328	592.5	490	239	552	567	468.03	405	400.25	468
June	328	592.5	490	239	552	567	468.03	405	400.25	468

Source: Calculated from the National Council of Welfare (1989, 1990) using a formula provided by the National Council of Welfare.

Note: Shaded areas indicate a benefit rate change.

Table B.2 Provincial Benefit Rates for Single Parents with One Child

	Nfld.	PEI	NS	NB	Que.	Ont.	Man.	Sask.	Alta.	BC
1989	**9486**	**9570**	**9408**	**7624**	**8583**	**10806**	**7887**	**9927**	**9006**	**9714**
Jan.	775	785.5	784	628.22	684.7	900.5	657.25	827.25	750.5	782
Feb.	775	785.5	784	628.22	684.7	900.5	657.25	827.25	750.5	782
March	775	785.5	784	628.22	684.7	900.5	657.25	827.25	750.5	782
Apr.	775	785.5	784	628.22	684.7	900.5	657.25	827.25	750.5	782
May	806	785.5	784	628.22	684.7	900.5	657.25	827.25	750.5	782
June	806	785.5	784	628.22	684.7	900.5	657.25	827.25	750.5	782
July	806	809.5	784	628.22	684.7	900.5	657.25	827.25	750.5	837
Aug.	806	809.5	784	628.22	758	900.5	657.25	827.25	750.5	837
Sept.	806	809.5	784	649.56	758	900.5	657.25	827.25	750.5	837
Oct.	806	809.5	784	649.56	758	900.5	657.25	827.25	750.5	837
Nov.	806	809.5	784	649.56	758	900.5	657.25	827.25	750.5	837
Dec.	806	809.5	784	649.56	758	900.5	657.25	827.25	750.5	837
1990	**9928**	**10113**	**9792**	**7868**	**9096**	**12780**	**8200**	**10110**	**9006**	**10294**
Jan.	806	809.5	816	649.56	758	1065	683.33	827.25	750.5	837
Feb.	806	809.5	816	649.56	758	1065	683.33	827.25	750.5	837
March	806	809.5	816	649.56	758	1065	683.33	827.25	750.5	837
Apr.	806	829.5	816	649.56	758	1065	683.33	827.25	750.5	837
May	838	829.5	816	649.56	758	1065	683.33	827.25	750.5	837
June	838	829.5	816	649.56	758	1065	683.33	853.08	750.5	837

Source: Calculated from the National Council of Welfare (1989, 1990) using a formula provided by the National Council of Welfare.

Note: Shaded areas indicate a benefit rate change.

Table B.3 Definitions of Assets, Incomes, and Benefits by Province

Assets	Income	Benefits
General		
Certain exemptions are allowed with respect to actual and potential liquid assets and property of an individual or family applying for social assistance; any non-exempt assets are deemed to be available for current maintenance of applicants and their dependants. Homeowners applying for social assistance are not required to sell their principal residence and household effects as a condition of eligibility.	Once a household's assets have been determined to be within the limits allowed, income from all sources is examined in the calculation of entitlement to social assistance. Workers' compensation benefits or an Old Age Security pension and in most provinces, maintenance or alimony payments, are defined in legislation or policy as "unearned" and thus totally available for current maintenance. The net effect of unearned income is to reduce the amount of social assistance payable dollar for dollar. Other types of income, including the federal Child Tax Benefit, payment to foster parents and some special donations from charitable organizations are totally exempt in the calculation of financial resources. In some provinces, the earnings exemption provision applies only after initial eligibility has been established.	Budgetary requirements covered by basic social assistance include food, clothing, shelter and utilities, household and personal needs, and regularly recurring items of special need (in some provinces). In addition to financial assistance for basic needs, a wide range of items of special need and social services is also available, including allowances and services related to age, disability, employment, education, training and other special circumstances.
Newfoundland Social Assistance may be granted to persons who are physically present in Newfoundland, who lack adequate means to care properly for themselves and their dependants and for whom Social Assistance is necessary for proper maintenance or rehabilitation.		
Liquid assets include cash in the bank, readily marketable securities and investments in companies, but do not include life insurance policies and rural development grants. Applicants' liquid assets may not exceed the following level. Employable single person: $40 Employable family: $100 Unemployable single person: $2,500 Unemployable family: $5,000	In the determination of entitlement to benefits, a certain portion of monthly income from salary and wages may be exempted. Net earnings, against which the exemptions may be applied, are determined by deducting from the gross earnings of the applicant and spouse all compulsory deductions and work-related expenses.	Regular assistance is calculated using a pre-added budget, which establishes a maximum assistance level covering the total requirements of household for food, clothing, personal care, fuel, household maintenance and utilities. A special winter heating supplement is payable to Social Assistance households in the province.
Prince Edward Island Under the Welfare Assistance Act, assistance shall be provided to "any person in need and to any person who is not in need but likely to become a person in need if the goods or services are not provided."		
Liquid asset include cash on hand, in a bank, credit union or co-operative; the realizable value of stocks, bonds, debentures; the cash surrender value of life insurance policies; savings receipts; mortgages; and bequests or settlements. There is also a total exemption of a motor vehicle where it is required for employment or training purposes. Asset exemption level are as follow. Short-Term assistance (under 4 month): $50 Long-Term assistance: $200 for single person, and 1,200 for Single parent with one child:	The following involuntary deduction from the client's wages are not included in the computation of income; i) deductions for UI and CPP; ii) group life and group medical insurance premiums; iii) regular pension contributions; iv) income tax deductions and v) any other deductions that are a condition of receiving the salary or wages. If applicants are using their own vehicle to travel for their residence to their place of work, a maximum of $25 per week is allowed as an expense.	Maximum entitlement is based on a monthly budget for food, clothing, household and personal needs. plus an allowance to cover the actual cost of shelter up to stipulated maximum (provided that such cost does not exceed the beneficiary's reasonable needs or the cost of similar accommodation in the same community).

Table B.3 (Continued)

Assets	Income	Benefits
Nova Scotia (two-tier welfare system) The provincial and municipal level of government share responsibility for the provision of financial assistance to persons in need. The Family Benefits grants assistance to persons or families who are in Long-Term need and it is provided by province. General Assistance covers short-term needs and other special situations, and is provided by municipalities.		
Family Benefits (FBA) Liquid assets include cash, bonds, stocks, debentures, other assets that can be converted readily into cash, and a beneficial interest in assets held in trust and available to be used for maintenance. Not included as liquid assets are the value of prepaid funerals, student loans, any amount remaining to be paid under a mortgage or agreement for sale, the cash surrender value of a life insurance policy, and one reasonably priced motor vehicle where it is required due to lack of public transportation or remoteness. Asset exemption level: $1,500 for a single elderly person, $2,500 for a single parent household	No deductions or exemptions are allowed on wages in the calculation of initial eligibility of an applicant.	Shelter allowance covers the actual cost of rent or a mortgage, fuel, electricity, taxes, water, repayment of a home improvement loan, household supplies and house maintenance. Flat-rate personal allowances cover food, clothing and miscellaneous essentials, and are based on the family's composition and its living arrangement. Flat-rate allowances for routine transportation are payable to each FBA household.
Municipal General Assistance Municipalities require an applicant to expend liquid assets to meet ongoing needs before being considered as eligible for General Assistance. However, an applicant's residence, furnishings and car are not usually considered as financial resources unless their value is excessive.	Most Nova Scotia municipalities do not allow any exemptions on income from earnings or any other source. Income is equal to gross earnings minus routine deductions such as income tax, pension plan contributions, medical insurance, UI premiums and union dues.	Each municipality establishes its own rates subject to provincial approval.
New Brunswick Social assistance is provided by three separate programs of financial support for persons who lack the means to provide for their basic needs and the needs of their families, and who have no other source of financial support. Long-Term Established Needs (LTEN) provides assistance to disable person. Upgrading, Training and Placement provides assistance to a person in need who has upgrading, training or placement potential but who does not meet the criteria for either LTEN or IA. Interim Assistance (IA) provides assistance to i) persons age 19 to 54 who have high employment potential, ii) parent with dependants where the parent or spouse is eligible for and awaiting UI benefit or iii) person under 19 years old who is found to be unsuitable for his or her care, training and development.		
Liquid assets include cash on hand, convertible trust funds, mortgages or other collectible loans, valuables in a safety deposit box, property other than the applicant's residence and the cash surrender value of life insurance policies exceeding $1,000 per household. There is a total exemption of the value of one motor vehicle required for routine transportation, work or medical reasons. Liquid assets exemption: $500 per recipient, $1,000 per household.	Net income refers to gross amount earned minus involuntary deductions such as income tax, union dues, UI and CPP contributions and Blue Cross premiums.	Benefits include food, clothing, household and personal items, fuel and utilities, routine transportation and shelter. Fixed allowance levels vary according to each household's program classification (Long-Term Established Needs, Upgrading, Training and Placement, Interim Assistance).

Table B.3 (Continued)

Assets	Income	Benefits
Quebec Income security program in Quebec is composed of Financial Support Program and the Work and Employment Incentives Program (WEIP). The Financial Support Program is designed to meet the needs of people who are more or less permanently unemployable. WEIP promotes the integration or reintegration into the job market of all employable Income Security clients.		
The calculation of assets involves two separate steps, one for real and personal property and one for liquid assets. First, real and personal property includes the total market value of all property and other assets of the household that are not considered as a liquid asset. The net value of the household's residence is exempted up to $60,000, increased by $1,000 per full year of occupancy as owners of the residence in the case of a single adult or of a family eligible for the Financial Support Program. The aggregate value of the real and personal property is calculated by adding the gross value of the family's motor vehicle that exceeds $5,000 and the gross value of any other non-exempt real and personal property other than the household's residence. The exemption allowed on this aggregate value is $1,500 for a single person or $2,500 for a family. Any amount remaining after this exemption has been applied to the net value is imputed as income of the household at the rate of 2% per month. When it has been established that the value of real and personal property does not disqualify the household from receiving aid, the liquid assets of the single person or of the family are examined. Liquid assets include cash, fund in a financial institution, securities, stocks and bonds, debts owed to the client that may be acquitted immediately, any asset which is readily negotiable, and any term deposit made in favour of the household. Liquid assets not exceeding $2,500 for a single person and $5,000 for a family are exempted for beneficiaries of the Financial Support program; the allowable levels of exemption under WEIP are $1,500 and $2,500 respectively. The cash surrender value of a life insurance policy is totally excluded when calculating liquid assets.	Income includes employment earning and net self-employment income deducted by i) income tax, UI and health insurance premiums; ii) contributions to the Quebec Pension Plan; iii) union dues, and iv) the lesser of $25 monthly or 6% of monthly employment earnings, in respect of work-related expenses.	Benefits structures for Financial Support and WEIP were initially based on data supplied by Statistics Canada on expenditures actually incurred by the lowest 10% of low-income working households.
Ontario (two-tier welfare system) Short-Term or emergency financial assistance is granted by municipalities and Indian bands in accordance with the General Welfare Assistance Act, while the provincial government administers a program of Long-Term assistance under the Family Benefits Act. Family Benefits (FBA) program is composed of Regular Assistance and GAIN-D, a supplement for the disabled integrated with the integrated with the FBA program. General Welfare Assistance (GWA) program is composed of four subprograms; General Assistance, Supplementary Aid, Special Assistance and Work Activity.		

Table B.3 (Continued)

Assets	Income	Benefits
Family Benefits Program (FBA) Liquid assets include cash, bonds, stocks, debentures, an interest in real property, a beneficial interest in any convertible trust funds and any other assets that can be readily converted to cash. The exemption allowed for single parent with one dependant or for a childless couple is $5,000, increased by $500 for each additional dependant.	Income is defined as the gross monthly income of a client and spouse from wages, salaries and casual earnings and the net monthly income from an interest in or operation of a business less; i) income tax, CPP, UI, union dues and mandatory pension contributions; ii) earnings exemption; iii) cost of child care expenses incurred for employment or training.	The FBA Regular Assistance rate structure is based on a pre-added budget that comprises basic needs and special need items. Variables affecting the entitlement of any given household include the number of beneficiaries in that household, the ages of any dependent children, the type of accommodation and whether heating is included in the cost of shelter or paid separately.
General Welfare Assistance Provincial GWA guidelines allow municipal or regional welfare administrators to establish asset exemption levels for their jurisdiction up to the levels allowed under the FBA Regular Assistance or GAIN-D.	All provisions noted under "Income" in the Family Benefits Regular Assistance summary apply to GWA General Assistance.	As with FBA Regular Assistance, a General Assistance pre-added budget covers basic needs and special needs. Entitlement varies according to the size of household, the ages of any dependent children, the type of accommodation and whether heat is included in the cost of shelter or paid separately.
Manitoba (two-tier welfare system) The province of Manitoba has a two-tier system of social assistance comprising the provincial Social Allowances Program and the Municipal Assistance Program. Social Allowances are payable to persons potentially in need for prolonged periods, usually by reason of age, mental or physical disability, participation in approved academic or vocational training, or the sole support of dependent children. Municipal Assistance grants to persons in short-term need who are ineligible for provincial Social Allowances.		
Social Allowances Liquid assets include cash on hand or in a bank or other institution, bonds, shares, annuities, mortgages, agreements for sale, funds held in trust and any other convertible assets. The cash surrender value of life insurance policies up to $2,000 is exempt from the calculation of financial resources to determine eligibility for Social Allowances. Any lump sum received as cash replacement for lost material assets, compensation for injury, disability, retirement or death is considered a liquid asset and subject to asset exemption. Short-Term General Assistance applicants and student applicants are not allowed any liquid asset exemptions. Exemption for long-term General Assistance is $400 for each recipient in the household and $2,000 for a maximum family exemption.	Persons who are on financial assistance for at least 30 days may be eligible for earnings exemptions under the Work Incentive provision. Earnings before exemption are allowed to be deducted by CPP, UI, necessary work expenses. Income tax is not deductible but income tax refunds are exempt from the calculation of a client's financial resources.	The monthly Social Allowance entitlement of a household for basic needs is calculated according to a pre-added budget for food, clothing, household supplies and personal needs, and a separate allowance for shelter and utilities. Each Social Allowance household is entitled to assistance for miscellaneous special needs up to $150 per year, with prior approval.
Municipal Assistance Winnipeg allows applicants to retain life insurance policies with a cash surrender value of up to $2,000 per household, equity in the house owned and occupied by the applicant, plus, at the director's discretion, a motor vehicle. All other assets of the household are considered as financial resources available for ongoing maintenance.	A municipality may grant a total or partial exemption of income from any source in the determination of an applicant's eligibility.	Each municipality in the province sets its own benefit levels under this program by a decision of the local elected officials.

Table B.3 (Continued)

Assets	Income	Benefits
Saskatchewan Saskatchewan Assistance Plan (SAP) grants social assistance to any person or family head who can establish eligibility according to the needs test.		
Liquid assets of a household include cash on hand, in the bank or other institution, the immediate realizable value of stocks, bonds or other securities, mortgages, agreements for sale, wills and other settlements. Prepaid funeral expenses not exceeding $2,500 and the total cash surrender value of life insurance are excluded from the calculation of financial resources for each household. Maximum asset exemption is $1,500 for any single recipient and $3,000 for any recipient with a dependant, plus $500 for each additional dependant.	Saskatchewan includes the first $34.88 (figure for 1993) of the monthly federal Child Tax Benefit for each dependent child as income in the determination of financial eligibility for social assistance for all households with dependent children. Fully employable clients are not entitled to an earnings exemption for the first three months on social assistance.	Benefits are based on a pre-added budget, which covers support and shelter requirements. The support component of the budget covers food, clothing, personal needs and household maintenance and it is based solely on the number of adults and dependent children in the household.
Alberta Two programs, Social Allowance program and Assured Income for the Severely Handicapped (AISH) program, are provided by Department of Family and Social Services. Social Allowance or Supports for Independence is composed of four sub-programs; i) Supplement to Earnings; ii) Employment and Training Support; iii) Transitional Support; and iv) Assured Support.		
Liquid assets include cash, stocks, bonds, securities, cash surrender value of life insurance policies, and any real estate (other than the applicant's home, furniture and quarter section of land if residing on a farm) that can be sold or against which a loan may be secured. One transportation vehicle may be exempted where the client's equity in it does not exceed $7,500; a second vehicle is allowed provided that the clients' equity in the two vehicles does not exceed $7,500 and the second vehicle is required for employment or medical purposes. A maximum for liquid asset exemption is $1,500 (no more than $50 in cash, bank accounts or government bonds) for an employable single person and $2,500 (no more than $250 in cash, bank accounts or government bonds) for an able-bodied applicant with dependants.	The earnings exemption provision cannot be used to establish eligibility in new and reopened cases. Earnings include wages, salaries, commissions, tips, training allowance, income from baby-sitting at home, special foster care rates exceeding normal rates, and services in kind. The only deductions allowed to establish net income are statutory deductions and health insurance premiums, pension contributions, union dues and meal expenses. Reasonable expenses incurred for baby-sitting and transportation for employment purposes may be allowed as deductions from earnings.	Benefit rates vary by family size. They include flat rate amounts for food, clothing, personal and household needs, telephone, laundry and transportation. The shelter allowance covers, up to stipulated maximum based on the size of the household, either the actual cost of rent, fuel and utilities, or, in the cash of purchased of sale, municipal taxes, fire insurance, fuel and utilities, condominium fees, homeowner's maintenance allowance and lot rental for mobile homes.
British Columbia Programs for Independence grant to people under two separate programs; Income Assurance and Temporary Assistance. Income Assurance comprises Handicapped Benefits and Seniors Benefits. Temporary Assistance provides; i) temporary benefits needed to meet basic needs while recipients are between jobs and have exhausted all other sources of income; ii) all recipients the available temporary benefits and services required both to meet their basic needs. It covers all persons in need who are not categorically eligible for Income Assurance.		

Table B.3 (Concluded)

Assets	Income	Benefits
Liquid assets include cash or equity in property (excluding the family home and car), stocks, bonds, certificates or other possessions that may be converted to cash, including any beneficial interest in real or personal property held in trust. The cash surrender value of an uncashed life insurance policy, prepaid funerals, and one motor vehicle for transportation are exempted. Liquid asset exemption is $2,500 for single person and $5,00 for family with one dependant.	Net income includes; i) gross wages less income tax, UI and CPP contributions, medical insurance premiums, superannuating or company pension plan deductions, and union dues; ii) income tax and pension plan refunds; iii) net income from roomers and boarders; and iv) education bursaries or loans.	Temporary assistance benefit levels consist of two components; the Support Component and the Shelter Variable. The Support Component covers food, clothing, household and personal needs, and is a pre-added amount based on family size, the duration on assistance and the age and employability status of the head of the household. the Shelter Variable covers rent or net mortgage payments, house insurance premiums, property taxes, normal household maintenance and utilities.

Source: Human Resources Development Canada (1994).

Table B.4 The Earned Income Exemption (monthly)

Province	Year	Earned Income Exemptions
Newfoundland	1989 and 1990	Unemployable: $30 plus 50% of allowable income over $30 (maximum exemption is $115). Employable: 50% of earnings. Maximum exemption is $40 for a single adult and $100 for a family.
Prince Edward Island	1989	All: 20% of net wages for the first six months on assistance and 10% of wages for next six months; no earnings exemption after that time.
	1990	Single person: $50 plus 10% of the balance of net earnings. Family: $100 plus 10% of the balance of net earnings.
Nova Scotia	1989 and 1990	Unemployable: $200 plus 25% of gross wages. Single person: $50. Family: $100.
New Brunswick	1989 and 1990	Unemployable: $200. Single person: $150. Family: $200.
Quebec	1989	Unemployable: $100. Employable: $80.
	1990	Unemployable: $100. Employable: $84.
Ontario	1989 and 1990	Unemployable: $175 plus 20% of earnings over $175. Single person: $75 plus 20% of net earnings. Family: $175 plus 20% of net earnings.
Manitoba	1989 and 1990	Unemployable: the greater of $50 a month, 70 cents for each hour worked, or 30% of gross earnings.
	1989	Employable: $200.
	1990	Employable: $225.
Saskatchewan	1989 and 1990	Single person: $25 plus 20% of the excess (maximum exemption is $75). Family: $50 plus 20% of the excess (maximum exemption is $150).
Alberta	1989 and 1990	All:100% of earnings up to $115; 50% of earnings between $116 and 200; 25% of earnings between $201 and $300; 10% exemption on earnings over $300.
British Columbia	1989 and 1990	Single person: $50 plus 25% of net earnings. Family: $100 plus 25% of net earnings.

Source: National Council of Welfare (1989, and 1990)

Note: Single parents with children below age 2 are assumed unemployable. The level of earned income exemption for a family will be applied to a single parent with children below age 2 if the unemployable level is not specified. The level of the earned income exemption for disabled persons are not included in this Table. For Prince Edward Island, the earned income exemption in 1989 is assumed to be 20 percent of gross wages.

Table B.5 The Welfare Benefit Calculation

Province	Year	Benefit equation
Nfld.	1989-90	$B_i = B_i' - \max\{0.5(w_iH_i), w_iH_i - 40\}$ for an employable adult.
		$B_i = B_i' - \max\{0.5(w_iH_i), w_iH_i - 100\}$ for an employable family.
		$B_i = B_i' - \max\{0, 0.5(w_iH_i - 30), w_iH_i - 115\}$ for an unemployable person.
PEI	1989	$B_i = B_i' - \max\{0, 0.8(w_iH_i)\}$.
	1990	$B_i = B_i' - \max\{0, 0.9(w_iH_i - 100)\}$.
NS	1989-90	$B_i = B_i' - \max\{0, w_iH_i - 50\}$ for a single person.
		$B_i = B_i' - \max\{0, w_iH_i - 100\}$ for a family.
		$B_i = B_i' - \max\{0, 0.75(w_iH_i - 200)\}$ for an unemployable person.
NB	1989-90	$B_i = B_i' - \max\{0, w_iH_i - 150\}$ for a single person.
		$B_i = B_i' - \max\{0, w_iH_i - 200\}$ for a family.
Que.	1989	$B_i = B_i' - \max\{0, w_iH_i - 80\}$ for an employable person.
	1990	$B_i = B_i' - \max\{0, w_iH_i - 84\}$ for an employable person.
	1989-90	$B_i = B_i' - \max\{0, w_iH_i - 100\}$ for an unemployable person.
Ont.	1989-90	$B_i = B_i' - \max\{0, 0.8(w_iH_i - 75)\}$ for a single person.
		$B_i = B_i' - \max\{0, 0.8(w_iH_i - 175)\}$ for a family.
Man.	1989	$B_i = B_i' - \max\{0, w_iH_i - 200\}$.
	1990	$B_i = B_i' - \max\{0, w_iH_i - 225\}$.
	1989-90	$I_x = \min\{w_iH_i, \max\ \{50, 0.7H_i, 0.3w_iH_i\}\}$.
		$B_i = B_i' - \{\max\{0, \min\{w_iH_i - 50, w_iH_i - 0.7H_i, 0.7w_iH_i\}\}$ for an unemployable person.
Sask.	1989-90	$B_i = B_i' - \max\{0, 0.8(w_iH_i - 25), w_iH_i - 75\}$ for a single person.
		$B_i = B_i' - \max\{0, 0.8(w_iH_i - 50), w_iH_i - 150\}$ for a family.
Alta.	1989-90	$B_i = B_i' - \max\{0, 0.5(w_iH_i - 115), 0.75(w_iH_i - 200)+42.5, 0.9(w_iH_i - 300) +117.5\}$.
BC	1989-90	$B_i = B_i' - \max\{0, 0.75(w_iH_i - 50)\}$for a single person.
		$B_i = B_i' - \max\{0, 0.75(w_iH_i - 100)\}$ for a family.

Note: The benefit equations in this Table are derived from the provincial regulations given in Table B.3. Some modifications are made due to limitations of the data, *i.e.*, gross earnings are used instead of net earnings. These equations are for both employable and unemployable persons unless otherwise specified. Unemployable persons, here, are single parents who have children below age two.

Table B.6 Welfare Eligibility and Participation

Eligibility	SA participation		Total
	Non-participant	Participant	
Single Persons			
Ineligible	31,142	**65**	31,207
Eligible	11,829	1,164	12,993
Total	42,971	1,229	44,200
Single Parents			
Ineligible	3,419	**14**	3,433
Eligible	9,671	3,981	13,652
Total	13,090	3,995	17,085

APPENDIX C

DATA MANIPULATION

This appendix explains how the panel data are converted to a set of monthly cross-section observations. In order to make the process easy to follow, some examples are illustrated. Therefore, figures shown in the tables in this section are not from the Labour Market Activity Survey (LMAS).

The Labour Market Activity Survey (LMAS) 1988-1990 is a longitudinal survey that reports data in two files: person and job files.

1. Person file (55,434 observations): Table C.1

Each record in this file contains a person ID, annual values of the household's demographic variables from 1988 to 1990, the person's monthly social assistance (SA) status from January 1989 to December 1990, and other variables. One record in this file represents one person.

2. Job file (97,081 observations): Table C.2

Each record in this file is a job record, and contains a person ID, job ID, the weeks that each respondent started and stopped working (for this job record) between 1988 and 1990, annual average wages and tips and other job-related variables. Each record in this file represents one job. A person can have more than one job record between 1988 and 1990.

The data reported in LMAS 1988-90 is not in a format which can be directly used in our empirical analysis. As shown in Table C.3, the empirical analysis uses a set of monthly cross-section observations. Each observation represents the data for a particular month for a particular respondent. Each respondent has 17 monthly records covering the period between February 1989 and June 1990.[1] Columns C to G in Table C.3 are obtained from the job file and columns H to L are obtained from the person file.

The same person ID is used in both the person and job files to indicate the same respondent. This makes it possible to manipulate these person and job files separately and, afterwards, to aggregate them into one data file which is sorted by person ID.

Individuals who are single persons or single parents, not disabled or disabled but not limited at work, 19 to 65 years old, and heads of household, and who have no pension income and who spend less than 8 months as a full-time student annually in both 1989 and 1990 are included in the sample (as discussed in Chapter 3).

Data manipulations are undertaken in two parts. Part one is for the demographic variables, which are manipulated using the "SPSS" software. Part two is for the income and social assistance variables which are manipulated using the "Quattro Pro" software after which the results are exported to an SPSS data file. The results from these two parts are merged together into one ASCII file (similar to the one in Table C.3). The ASCII file is then imported into the "LIMDEP" software for the regression analyses.

---

[1] This time period is chosen because the monthly social assistance status in the LMAS starts in January 1989 and ends in December 1990. A one month-lag of social assistance and a six month-lead of an individual's earnings are required for the estimation.

C.1 Demographic variables: Columns A to B and J to L in Table C.3

The variables in columns J to L of Table C.3 include gender, household characteristics, age group, education, province of residence, visible minority status, disability status, and other variables. These variables are derived from columns B to I in Table C.1.

Columns A to I of Table C.1 are split into two data files as shown in Table C.4. One is for the year 1989 and the other is for the year 1990. Variables that refer to demographic status in 1988 are not included. Each record in the 1989 file is duplicated 11 times to form 11 monthly observations from February 1989 to December 1989. Each respondent has the same data for these 11 records (*i.e.*, for person ID #1, the results look like cells J1 to L11 in Table C.3). Each record in the 1990 file is duplicated 6 times to form 6 monthly observations from January 1990 to June 1990 (cells J12 to L17 in Table C.3 for person ID#1).

After duplicating the records, the 1989 and 1990 files are merged into a new file. The data in this file are sorted in an ascending order according to person ID and month. The result is column A to B and J to L in Table C.3.

C.2 Income and social assistance variables: Column A to I in Table C.3

Only paid workers and non-workers are included in the sample because we do not know the wage rate for other types of workers. The data from Table C.2 (job records) and columns J to M of Table C.1 (person records) are manipulated to obtain columns A to I of Table C.3. After copying Table C.2 to a new table (Table C.5), the following steps (explained in more detail subsequently) are utilized:

Step 1: Calculate which months each job was held (Table C.5).

Step 2: Calculate hours of work in each month (Table C.5).

Step 3: Calculate monthly earnings (Table C.5).

Step 4: Aggregate earnings and hours of work from the edited job record file (Table C.5) to get a data file in which each record contains all job information for a person (Table C.6) in a particular month.

Step 5: Calculate an average hourly wage rate for each month (Table C.6).

Step 6: Copy monthly social assistance information from the person file (Table C.6).

Step 7: Import the file (Table C.6) into a spreadsheet (Table C.7) and rearrange the data (Table C.8) to get Table C.3.

Step 1

From the LMAS job file (Table C.2), we know the class of worker, average hours worked per month, the start and stop week for each job, the amount of wages and tips, and other job characteristics. If a person had no job during 1988 to 1990, the cells in column C will be blank (*e.g.*, person ID #18 in Table C.2).

From the example in Table C.2, person ID #1 worked in job #1 from week 4544 (which corresponds to February 1st, 1988) to week 4648 (which corresponds to January 31st, 1990). Thus, in row 1 of Table C.5, which refers to job#1 of person ID#1, dummy variables d08 to d12 for 1988, d01 to d12 for 1989, and d01 for 1990 (cells C1 to T1) are set to one, while d02 to d12 for 1990 are set to zero.[2] Person #1 worked in job #2 from January 1st, 1990 to December 31st, 1990.[3] Therefore, in row 2 of Table C.5, which refers to job #2 of person #1, dummy variables d01 to d12 for 1990 are set to one (cell T2 to W2) while all other work dummy variables (cells L2 to S2) are set to zero. This process continues for all job records and finally yields the working status for all job records for each person (columns L to W of Table C.5).

Step 2

Monthly hours of work for each job are calculated in columns X to AI in Table C.5. Columns D to F of Table C.5 give the average hours of work per month in 1988, 1989, and 1990. The average hours of work in each month from August 1988 to December 1988 can be obtained by multiplying columns L to O by column D. The average hours of work in each month from January 1989 to December 1989 can be obtained by multiplying columns P to S by column E. The average hours of work in each month from January 1990 to December 1990 can be obtained by multiplying columns T to W by column F. The results are in columns X to AI.

Step 3

To obtain monthly earnings from each job, we multiply monthly hours of work by average monthly wages and tips (hereafter referred to as wages). Columns X to AA are multiplied by column I, columns AB to AE are multiplied by column J, and columns AF

---

[2] Data from January to July 1988 are not required since our sample covers the period from February 1989 to June 1990 and only a six-month lag of income is used.

[3] December 31st, 1990 corresponds to week 4,696. Thus, person #1 was still holding job #2 in the survey week.

to AI are multiplied by column K. The results are monthly earnings from each job between 1988 and 1990 (columns AJ to AU).

Step 4

Using SPSS,[4] for each person we aggregate the monthly income and hours of work for each job (in Table C.5) to obtain total monthly income and hours of work. The results of this aggregation are in columns B to M and N to U in Table C.6. One record represents one respondent. To obtain income from all jobs of person ID #1 in August 1988, cells AJ1 and AJ2 of Table C.5 are summed. The result is shown in cell B1 in Table C.6. To obtain income from all jobs of person ID #124 in August 1988, cells AJ4 to AJ7 are summed and the result is shown in cell B3 in Table C.6. This method is also used to aggregate hours of work across different jobs for each individual. The hours of work before January 1989 are not required in the sample.

Step 5

The average hourly wage rate for each month is calculated by weighting the annual average hourly wage rate from each job (columns I to K in Table C.5) by monthly hours of work from each job (column X to AI in Table C.5) and dividing by monthly hours of work from all jobs. For example (see the shaded areas of Table C.5), the average wage for January 1990 of person #1 is [hourly wage rate for job #1 in 1990 (cell K1) × hours of work for job #1 in January 1990 (cell AF1)] plus [hourly wage rate for job #2 in 1990 (cell K2) × hours of work for job #2 in January 1990 (cell AF2)] and then divided

---

[4] Using the AGGREGATE command in SPSS.

by [total hours of work for all jobs in January 1990 (cell AF1 + AF2)]. This yields [(22 × 80) + (25 × 80)] / 160 = 23.5, as shown in cell Z1 in Table C.6. The results from the wage calculation for each month are shown in columns V to AC in Table C.6.

Step 6

To obtain monthly social assistance status, we copy cells J to M from Table C.1 to cells AD to AK in Table C.6. Therefore, Table C.6 now contains monthly income from August 1988 to December 1990 (columns B to M), monthly hours of work (columns N to U), the hourly wage rate for each month (column V to AC), and social assistance status for each month from January 1989 to December 1990 (column AD to AK). Each row represents one person. This table is in one SPSS file.

Step 7

After importing Table C.6 to a worksheet and transposing it, the data file is shown in Table C.7 (columns A to G).[5] The columns now represent persons and rows represent the different variables in different months. After manipulating this file (as see below) we will obtain monthly current income (Y0), past income (Y_{t-1}, Y_{t-2}, Y_{t-3}, Y_{t-4}, Y_{t-5}, Y_{t-6}), future income (Y_{t+1}, Y_{t+2}, Y_{t+3}, Y_{t+4}, Y_{t+5}, Y_{t+6}), hours of work (HOUR), wages (W), and current and previous social assistance status (SA, SA_{t-1}).

[5] For hours of work and wages, only data from February 1989 to June 1990 are imported to the worksheet.

To rearrange the data in the desired format, we need at least four worksheets.[6] We name these worksheets: INPUT, WORK AREA, RESULT, and OUTPUT. In OUTPUT, sets of number between 2 and 18 (representing 17 months) are inserted in column B for each person. Column A contains a person ID and the data are rearranged by variable starting with the current income variable.

The following steps show how to rearrange variable Y0 (see Table C.8). We suppose that there are 4 persons in the data file.

1. Copy A8 to D24 from INPUT (17 monthly observations per person) to column A of WORK AREA;

2. Name column A of WORK AREA as TEMP;

3.1 Copy TEMP to a cell where the cursor is located in RESULT and then move the cursor down by 17 cells for 17 monthly observations (The cursor is at cell A1 when we do this step for the first time as in the sheet in Table C.8 labeled "RESULT-STEP 1.");

3.2 Delete column A of WORK AREA (column B is automatically moved to column A automatically);

3.3 Repeat step 2 to 3.3 until the end of data in WORK AREA is reached (The result will look like the sheet in Table C.8 labeled "RESULT-COMPLETE.");

4. Copy column A of "RESULT-COMPLETE" to column C of OUTPUT.

---

[6] Due to software limitations and a large data file, we must separate the data into many input and output sheets. In our case, we used 23 sheets, each of which contains data for 250 persons.

A similar procedure is used to rearrange the data for other variables. For example, for Y_{t-6}, we copy cells A2 to D18 of INPUT to WORK AREA and then steps 2 to 3.3 are repeated. In step 4, we copy column A in "RESULT-COMPLETE" to column D in OUTPUT. The variables Y_{t-1} to Y_{t-6} are averaged to form average past income (Y_6) while Y_{t+1} to Y_{t+6} are averaged to give an average future income (Y6).

The final results in OUTPUT consist of person ID, month, and seven other variables. All variables are finally exported to an SPSS data file (columns A to I of Table C.3) and included with the demographic variables (columns J to L of Table C.3).

Table C.1 Example: the LMAS Person File

person ID	gender	household characteristic 1988	1989	1990	education 1988	1989	1990	other demographic variables 1989 1990	Social Assistance Status Jan. 89	Feb. 89	...	Dec. 90
1	1	1	1	1	7	7	7	A B	0	0	...	0
18	0	4	4	4	1	1	1	C D	1	1	...	1
124	0	3	3	3	4	4	4	...	0	0	...	0
200	1	4	4	4	3	3	3	...	0	0	...	1
etc.												

Note: All figures are assumed.

gender:
=0 for female
=1 for male

household characteristic:
=1 for no spouse, no children
=2 for spouse is present, no children
=3 for spouse is present, there are children
=4 for no spouse, there are children

Social Assistance status:
=0 for not on social assistance
=1 for on social assistance

other demographic variables:
A, B, C, and D are vectors of the dummy variables that represent other demographic characteristics.

education:
=1 for 0 to 8 years
=2 for some secondary education
=3 for graduated from high school
=4 for some post-secondary
=5 for post-secondary cert. or diploma
=6 for university
=7 for trades certificate or diploma

Table C.2 Example: the LMAS Job File

person ID	job ID	class of worker	paid hour per month work 1988	1989	1990	start week of job	stop week of job	wages and tips 1988	1989	1990
1	1	1	160	160	80	4544	4648	20	22	22
1	2	1			80	4644	4709			25
18	1									
124	1	1	16	16	16	4548	4709	25	25	25
124	2	1	120			4552	4569	30		
124	3	1	120	120		4570	4596	30	30	
124	4	1		120	120	4596	4709		35	40
200	1	1	10			4550	4551	5		
etc.										

Note:

class of worker:
=1 for paid worker
=2 for unpaid family worker
=3 for uncorporated business-with paid help
=4 for incorporated businee-no paid help
=5 for not incorporated business-with paid help
=6 not incorporated business-no paid help
=9 self-employed, not specified
blank= non-worker

start and stop week of work:
The value corresponds to the week number since December 31, 1900. Week number 4539 corresponds to week one of 1988. Week number 4696 is the last week in 1990. If the job continues past December 31st, 1990, then the survey week is shown in the field.

Table C.3 The Format of Data Used for Estimation

person ID	month	Y0	Y6	Y_6	W	HOUR	SA	SA_1	gen-der	household characteristic	other variables from Table B1
1	2	3520	3520	3253	22	160	0	0	1	1	A
1	3	3520	3520	3307	22	160	0	0	1	1	A
1	4	3520	3520	3360	22	160	0	0	1	1	A
1	5	3520	3520	3413	22	160	0	0	1	1	A
1	6	3520	3520	3467	22	160	0	0	1	1	A
1	7	3520	3560	3520	22	160	0	0	1	1	A
1	8	3520	3307	3520	22	160	0	0	1	1	A
1	9	3520	3053	3520	22	160	0	0	1	1	A
1	10	3520	2800	3520	22	160	0	0	1	1	A
1	11	3520	2547	3520	22	160	0	0	1	1	A
1	12	3520	2293	3520	22	160	0	0	1	1	A
1	13	3760	2000	3520	23.5	160	0	0	1	1	B
1	14	2000	2000	3560	25	80	0	0	1	1	B
1	15	2000	2000	3307	25	80	0	0	1	1	B
1	16	2000	2000	3053	25	80	0	0	1	1	B
1	17	2000	2000	2800	25	80	0	0	1	1	B
1	18	2000	2000	2547	25	80	0	0	1	1	B
18	2	0	0	0	0	0	1	1	0	4	C
18	3	0	0	0	0	0	1	1	0	4	C
18	4	0	0	0	0	0	1	1	0	4	C
18	5	0	0	0	0	0	1	1	0	4	C
...											
etc.											

Note: month = 2 for February 1989, = 3 for March 1989, ... , = 18 for June 1990.
Y0 = income this month.
Y6 = average income in the next six months.
Y_6 = average income in the past six months.
W = average wages plus tips.
HOUR = total monthly hours of work.
SA = social assistance status (1 for on SA)
SA_1 = social assistance status last month.

Table C.4 Example: Two Separate Data Files Obtained from Columns A to I of Table C.1

1989

	A	B	C	D	E	F	G
1	person ID	gen-der	household characteristic 1989	education 1989	age group 1988	province 1989	number of kids 1989
2	1	1	1	7	4	35	0
3	18	0	4	1	3	35	1
4	124	0	3	4	5	48	2
5	125	1	1	3	3	48	0
6	200	1	4	3	4	59	1
7							
8	etc.						

Note: derived from Table C1
Column B is from column B, column C is from column D, column D is from column G, and column E, F and G are from column I of Table C.1.

1990

	A	B	C	D	E	F
1	person ID	household characteristic 1990	education 1990	age group 1988	province 1990	number of kids 1990
2	1	1	7	4	35	0
3	18	4	1	3	35	1
4	124	3	4	6	48	2
5	125	2	3	4	48	0
6	200	4	3	4	59	1
7						
8	etc.					

Note: derived from Table C.1
Column B is from column E, column C is from column H, and column D, E, and F are from column I of Table C.1.

age group for 1988:
=1 for 16 years
=2 for 17-19 years
=3 for 20-24 years
=4 for 25-34 years
=5 for 35-44 years
=6 for 45-54 years
=7 for 55-64 years
=8 for 65-69 years

province:
10 for Newfoundland
11 for Prince Edward Island
12 for Nove Scotia
13 for New Brunswick
24 for Quebec
35 for Ontario
46 for Manitoba
47 for Saskatchewan
48 for Alberta
59 for British Columbia

Table C.5 Example: Monthly Earnings and Wages by Job

person ID	job ID	class of worker	paid hour per month work			start week of job	stop week of job	wages and tips		
			1988	1989	1990			1988	1989	1990
1	1	1	160	160	80	4544	4648	20	22	[redacted]
1	2	1			80	4644	4709			
18	1									
124	1	1	16	16	16	4548	4709	25	25	25
124	2	1	120			4552	4569	30		
124	3	1	120	120		4570	4596	30	30	
124	4	1		120	120	4596	4709		35	40
200	1	1	10			4550	4551	5		
etc.										

Note: This table is from Table C.2.

person ID	job ID	work 1988				work 1989				work 1990			
		d08	d09	...	d12	d01	d02	...	d12	d01	d02	...	d12
1	1	1	1	...	1	1	1	...	1	1	0	...	0
1	2	0	0	...	0	0	0	...	0	1	1	...	1
18	1	0	0	...	0	0	0	...	0	0	0	...	0
124	1	1	1	...	1	1	1	...	1	1	1	...	1
124	2	0	0	...	0	0	0	...	0	0	0	...	0
124	3	1	1	...	1	1	0	...	0	0	0	...	0
124	4	0	0	...	0	0	1	...	1	1	1	...	1
200	1	0	0	...	0	0	0	...	0	0	0	...	0

Note: dj=1 if working for a job in month j, =0 for no job.

person ID	job ID	hour of work 1988				hour of work 1989				hour of work 1990			
		h08	h09	...	h12	h01	h02	...	h12	h01	h02	...	h12
1	1	160	160	...	160	160	160	...	160	[redacted]	0	...	0
1	2	0	0	...	0	0	0	...	0	[redacted]	80	...	80
18	1	0	0	...	0	0	0	...	0	0	0	...	0
124	1	16	16	...	16	16	16	...	16	16	16	...	16
124	2	0	0	...	0	0	0	...	0	0	0	...	0
124	3	120	120	...	120	120	0	...	0	0	0	...	0
124	4	0	0	...	0	0	120	...	120	120	120	...	120
200	1	0	0	...	0	0	0	...	0	0	0	...	0

person ID	job ID	income 1988				income 1989				income 1990			
		y08	y09	...	y12	y01	y02	...	y12	y01	y02	...	y12
1	1	3200	3200	...	3200	3520	3520	...	3520	1760	0	...	0
1	2	0	0	...	0	0	0	...	0	2000	2000	...	2000
18	1	0	0	...	0	0	0	...	0	0	0	...	0
124	1	400	400	...	400	400	400	...	400	400	400	...	400
124	2	0	0	...	0	0	0	...	0	0	0	...	0
124	3	3600	3600	...	3600	3600	0	...	0	0	0	...	0
124	4	0	0	...	0	0	4200	...	4200	4800	4800	...	4800
200	1	0	0	...	0	0	0	...	0	0	0	...	0

Table C.6 Example: Monthly Earnings, Average Wages and Social Assistance Status

person	income 1988				income 1989				income 1990			
ID	y08	y09	...	y12	y01	y02	...	y12	y01	y02	...	y12
1	3200	3200	...	3200	3520	3520	...	3520	3760	2000	...	2000
18	0	0	...	0	0	0	...	0	0	0	...	0
124	4000	4000		4000	4000	4600		4600	5200	5200		5200
200	0	0	...	0	0	0	...	0	0	0	...	0
etc			...				...				...	

person	hour of work 1989				hour of work 1990			
ID	h01	h02	...	h12	h01	h02	...	h12
1	160	160	...	160	160	80	...	80
18	0	0	...	0	0	0	...	0
124	136	136	...	136	136	136	...	136
200	0	0	...	0	0	0	...	0

person	wages 1989				wages 1990			
ID	w01	w02	...	w12	w01	w02	...	w12
1	22	22	...	22	23.5	25	...	25
18	0	0	...	0	0	0	...	0
124	29.4	33.8	...	33.8	38.2	38.2	...	38.2
200	0	0	...	0	0	0	...	0

person	social assistance 1989				social assistance 1990			
ID	p01	p02	...	p12	p01	p02	...	p12
1	0	0	...	0	0	0	...	0
18	1	1	...	1	1	1	...	1
124	0	0	...	0	0	0	...	0
200	0	0	...	0	0	0	...	1

Table C.7 Example: Transposed Data

			COLUMNS						
person ID	ROWS		1	18	124	200		...	last person
earnings	Aug-88	[illegible]	3200	0	4000	0			
	Sep-88	[illegible]	3200	0	4000	0			
	Oct-88	[illegible]	3200	0	4000	0			
	Nov-88	[illegible]	3200	0	4000	0			
	Dec-88	[illegible]	3200	0	4000	0			
	Jan-89	[illegible]	3520	0	4000	0			
	Feb-89	[illegible]	3520	0	4600	0			
	Mar-89	[illegible]	3520	0	4600	0			
	Apr-89	10	3520	0	4600	0			
	May-89	[illegible]	3520	0	4600	0			
	Jun-89	12	3520	0	4600	0			
	Jul-89	13	3520	0	4600	0			
	Aug-89	14	3520	0	4600	0			
	Sep-89	15	3520	0	4600	0			
	Oct-89	16	3520	0	4600	0			
	Nov-89	17	3520	0	4600	0			
	Dec-89	18	3520	0	4600	0			
	Jan-90	19	3760	0	5200	0			
	Feb-90	20	2000	0	5200	0			
	Mar-90	21	2000	0	5200	0			
	Apr-90	22	2000	0	5200	0			
	May-90	23	2000	0	5200	0			
	Jun-90	24	2000	0	5200	0			
	Jul-90	25	2000	0	5200	0			
	Aug-90	26	2000	0	5200	0			
	Sep-90	27	2000	0	5200	0			
	Oct-90	[illegible]	2000	0	5200	0			
	Nov-90	[illegible]	2000	0	5200	0			
	Dec-90	30	2000	0	5200	0			
hours of work	Feb-89	[illegible]	160	0	120	0			
	...	[illegible]		...		...			
	Jun-90	33	80	0	136	0			
wages	Feb-89	34	22	0	33.8	0			
	...	[illegible]		...		...			
	Jun-90	36	25	0	38.2	0			
social assistance	Jan-89	[illegible]	0	1	0	0			
	Feb-89	[illegible]	0	1	0	0			
	Mar-89	[illegible]	0	1	0	0			
	Apr-89	[illegible]	0	1	0	0			
	May-89	[illegible]	0	1	0	0			
	Jun-89	[illegible]	0	1	0	0			
	Jul-89	[illegible]	0	1	0	0			
	Aug-89	[illegible]	0	1	0	0			
	Sep-89	[illegible]	0	1	0	0			
	Oct-89	[illegible]	0	1	0	0			
	Nov-89	[illegible]	0	1	0	0			
	Dec-89	[illegible]	0	1	0	0			
	Jan-90	[illegible]	0	1	0	0			
	Feb-90	[illegible]	0	1	0	0			
	Mar-90	[illegible]	0	1	0	1			
	Apr-90	[illegible]	0	1	0	1			
	May-90	[illegible]	0	1	0	1			
	Jun-90	[illegible]	0	1	0	1			

Table C.8 Example: Rearranging Data File

1. INPUT

1	18	124	200
3200	0	4000	0
3200	0	4000	0
3200	0	4000	0
3200	0	4000	0
3200	0	4000	0
3520	0	4000	0
3520	0	4600	0
3520	0	4600	0
3520	0	4600	0
3520	0	4600	0
3520	0	4600	0
3520	0	4600	0
3520	0	4600	0
3520	0	4600	0
3520	0	4600	0
3520	0	4600	0
3520	0	4600	0
3760	0	5200	0
2000	0	5200	0
2000	0	5200	0
2000	0	5200	0
2000	0	5200	0
2000	0	5200	0
2000	0	5200	0
2000	0	5200	0
2000	0	5200	0
2000	0	5200	0
2000	0	5200	0
2000	0	5200	0
160	0	120	0
	...		...
80	0	136	0
22	0	33.8	0
	...		...
25	0	38.2	0
0	1	0	0
0	1	0	0
0	1	0	0
0	1	0	0
0	1	0	0
0	1	0	0
0	1	0	0
0	1	0	0
0	1	0	0
0	1	0	0
0	1	0	0
0	1	0	0
0	1	0	0
0	1	0	0
0	1	0	1
0	1	0	1
0	1	0	1
0	1	0	1

2. WORK AREA (Y0)

3520	0	4600	0
3520	0	4600	0
3520	0	4600	0
3520	0	4600	0
3520	0	4600	0
3520	0	4600	0
3520	0	4600	0
3520	0	4600	0
3520	0	4600	0
3520	0	4600	0
3520	0	4600	0
3760	0	5200	0
2000	0	5200	0
2000	0	5200	0
2000	0	5200	0
2000	0	5200	0
2000	0	5200	0

temp

3. RESULT-STEP 1

3520			
3520			
3520			
3520			
3520			
3520			
3520			
3520			
3520			
3520			
3520			
3760			
2000			
2000			
2000			
2000			
2000			

4. RESULT-COMPLETE

3520			
3520			
3520			
3520			
3520			
3520			
3520			
3520			
3520			
3520			
3520			
3760			
2000			
2000			
2000			
2000			
2000			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
4600			
4600			
4600			
4600			
4600			
4600			
4600			
4600			
4600			
4600			
4600			
5200			
5200			
5200			
5200			
5200			
5200			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			

5. OUTPUT

1	2	3520	3200
1	3	3520	3200
1	4	3520	3200
1	5	3520	3200
1	6	3520	3200
1	7	3520	3520
1	8	3520	3520
1	9	3520	3520
1	10	3520	3520
1	11	3520	3520
1	12	3520	3520
1	13	3760	3520
1	14	2000	3520
1	15	2000	3520
1	16	2000	3520
1	17	2000	3520
1	18	2000	3520
18	2	0	0
18	3	0	0
18	4	0	0
18	5	0	0
18	6	0	0
18	7	0	0
18	8	0	0
18	9	0	0
18	10	0	0
18	11	0	0
18	12	0	0
18	13	0	0
18	14	0	0
18	15	0	0
18	16	0	0
18	17	0	0
18	18	0	0
124	2	4600	4000
124	3	4600	4000
124	4	4600	4000
124	5	4600	4000
124	6	4600	4000
124	7	4600	4000
124	8	4600	4600
124	9	4600	4600
124	10	4600	4600
124	11	4600	4600
124	12	4600	4600
124	13	5200	4600
124	14	5200	4600
124	15	5200	4600
124	16	5200	4600
124	17	5200	4600
124	18	5200	4600
200	2	0	0
200	3	0	0
200	4	0	0
200	5	0	0
200	6	0	0
200	7	0	0
200	8	0	0
200	9	0	0
200	10	0	0
200	11	0	0
200	12	0	0
200	13	0	0
200	14	0	0
200	15	0	0
200	16	0	0
200	17	0	0
200	18	0	0

APPENDIX D

PROVINCE-RELATED DATA

The province-related data that are used in Chapter 3 are from CANSIM. The following are the variable descriptions and the CANSIM labels.

1. Consumer Price Indexes (C.P.I.) are used to calculate the real welfare benefit, wages and earnings. The weighted average of the monthly C.P.I. (1986 = 100) from three items; food, rent, and clothing, is used. These three items are chosen because welfare payments are adjusted in accordance with costs of food, rent, and clothing. For consistency, real wages and earnings are calculated using the same monthly weighted C.P.I. as the real benefit. The following are the CANSIM labels for monthly C.P.I. for food, rent, and clothing, respectively.

Newfoundland: P680001, P680078, and P680126.
Prince Edward Island: P680275, P680352, and P680400.
Nova Scotia: P680549, P680626, and P680674.
New Brunswick: P680823, P680900, and P680948.
Quebec: P681097, P681174, and P681223.
Ontario: P681372, P681449, and P681499.
Manitoba: P681648, P681725, and P681774.
Saskatchewan: P681923, P682000, and P682048.
Alberta: P682197, P682274, and P682322.
British Columbia: P682471, P682548, and P682597.

2. The Ratio of the Government Deficit to GDP (DEFGDP) is calculated by dividing the annual government deficit by annual current GDP. The government deficit is given by provincial government expenditures in excess of government revenues. CANSIM labels for provincial government expenditures and revenues are following.

Newfoundland: D12804 and D12836.
Prince Edward Island: D12864 and D12856.
Nova Scotia: D12884 and D12876.
New Brunswick: D12904 and D12896.
Quebec: D12924and D12916.
Ontario: D12944 and D12936.
Manitoba: D12964 and D12956.
Saskatchewan: D12984 and D12976.
Alberta: D13004 and D12996.
British Columbia: D12824 and D12816.

*3. **Gross Domestic Product (GDP)*** is the provincial GDP at market prices. The CANSIM labels for provincial Gross Domestic Product at market prices are as follows:

Newfoundland: D31720.
Prince Edward Island: D31742.
Nova Scotia: D31764.
New Brunswick: D31786.
Quebec: D31808.
Ontario: D31830.
Manitoba: D31852.
Saskatchewan: D31874.
Alberta: D31896.
British Columbia: D44014.

*4. **Per-Capita Income (PERY)*** is provincial annual current GDP (topic 3) deflated by monthly C.P.I. from three items (topic 1) divided by population. The following are the CANSIM labels for provincial annual population.

Newfoundland: C892586.
Prince Edward Island: C892904.
Nova Scotia: C893222.
New Brunswick: C893540.
Quebec: C893858.
Ontario: C894176.
Manitoba: C894494.
Saskatchewan: C894812.
Alberta: C895130.
British Columbia: C895448.

5. The unemployment rate (UNEMPR) is the monthly seasonally unadjusted unemployment rate by province. The CANSIM labels are as follows:

Newfoundland: D981021.
Prince Edward Island: D981394.
Nova Scotia: D981767.
New Brunswick: D982140.
Quebec: D982513.
Ontario: D982886.
Manitoba: D983259.
Saskatchewan: D983632.
Alberta: D984005.
British Columbia: D984378.

APPENDIX E

THE WAGE RATE ESTIMATION

E.1 Estimation Method

The estimates of the wage rate of non-workers are imputed using a Heckman two-step method which involves the estimation of labour force (LF_i^*) participation and log of the wage rate ($\ln w_i$) equations.

i) Labour Force Participation

The LF_i^* equation is first estimated by using a probit model. If an individual worked during the survey, a dummy variable (LF_i) representing whether an individual works equals one ($LF_i = 1$).[1] This LF_i variable equals zero for non-workers. The LF_i^* equation is defined as follows:

$$\text{(E.1)} \quad LF_i^* = X_{3i}\gamma_3 + \varepsilon_{3i}; \qquad LF_i = 1 \text{ if } LF_i^* > 0, \text{ and } LF_i = 0 \text{ otherwise},$$

where X_{3i} is a vector of variables, and γ_3 is a vector of parameters. The error term ε_{3i} is assumed to be distributed as a standard normal.

Equation (E.1) is estimated using data on all (workers and non-workers) individuals in the sample. The vector X_{3i} that determines the probability of working includes individual and household characteristics, seasonal influences, and the unemployment rate variables. The individual and household characteristics include

[1] It is assumed that all non-workers are in the labour force.

dummy variables representing age, education, gender, being a member of a visible minority, province of residence, and number of children at different age groups.

It is expected that individuals with high education have a high level of human capital investment and may be likely to have better job opportunities. A high level of education is, therefore, expected to increase the probability of working. Young individuals are more likely to work than older individuals since they are likely to be healthier. They also have to work more to provide for their future consumption when they become older and are less able to work. Eligible individuals who are members of a visible minority might have different tastes and opportunities for work than others. For example, they might want to work more, but their opportunities for work might be limited.

The number of small children might reduce the probability of work since the costs of childcare might be too high compared to earnings. However, having more children of school age requires higher expenditures and puts more pressure on the head of the household to work. Therefore, the number of children of school age is expected to increase the probability of working.

The vector X_{3i} also includes the unemployment rate variable. A high unemployment rate may reduce an individual's job opportunity and is expected to reduce the probability of working. Dummy variables representing gender, province, and seasonal effects (a dummy variable representing each month) are included to capture possible differences in job opportunities across these categories.

ii) The Wage Rate

Following the estimation of the labour force participation equation, the log of the wage rate equation ($\ln w_i$) is estimated using OLS. The data used include only workers who reported their wage rates. However, some workers in the sample reported unreasonably low wage rates (*e.g.*, 94 cents per hour). When estimating the wage rate equation, these workers were not included. A threshold real wage rate was arbitrarily set at \$3 per hour to eliminate these individuals.[2]

The inverse Mill's ratio ($\hat{\lambda}_i$) obtained from the LF_i^* equation is also included among the covariates in the wage equation to correct for sample selection bias. This ratio is calculated from $\phi_1(X_{3i}\hat{\gamma}_3)/\Phi_1(X_{3i}\hat{\gamma}_3)$, where ϕ_1 and Φ_1 are standard normal density and distribution function, respectively, and $\hat{\gamma}_3$ are the estimated coefficients from (E.1). Therefore, the log of the wage rate equation is:

(E.2) $\ln w_i = X_{wi}\gamma_w + \alpha_3\hat{\lambda}_i + \varepsilon_{wi}$,

where X_{wi} is a vector of variables, γ_w is a vector of parameters and α_3 is a covariance of the error terms, $E(\varepsilon_{3i}, \varepsilon_{wi})$, in equation (E.1) and (E.2) (Heckman, 1979, p. 154). The error term ε_{wi} has a normal distribution with zero mean and constant variance.

The vector X_{wi} includes dummy variables representing age, education, gender, being a member of a visible minority, province of residence, and month and the unemployment rate variable (Table E.1). Females may have lower expected wages than males since there might be gender discrimination among workers. Individuals from a visible minority group may have fewer job opportunities than others and, thus, may have a lower wage rate. Both well educated and older individuals generally have more

---

[2] There are 288 (2 percent of the sample) and 99 (0.7 percent of the sample) observations involving single persons and single parents, respectively, who have hourly real wage rate below \$3. These workers were treated as if they had reported zero wages.

knowledge and work experience, and are expected to have higher wage rates. A higher unemployment rate is expected to reduce the wage rate since it reduces job opportunities. Workers might have to accept a lower wage rate in order to retain their job. The province and month dummy variables are included to capture regional effects and seasonal effects on the wage rate.

The estimated coefficients from equation (E.2), in conjunction with data on X_{wi} are used to estimate the wage rate for non-workers and workers with real wages below \$3. The inverse Mill's ratio $(\hat{\lambda}_i)$ is included as an explanatory variable in the wage rate equation to correct the estimate of the γ_w parameter. After obtaining an unbiased estimate of γ_w, it is not necessary to include the inverse Mill's ratio in the predicted wage rate equation.[3] This means that expected value of ln (w_i) for non-workers is obtained as:

$$\text{(E.3)} \quad \widehat{\ln w_i} = X_{wi}\hat{\gamma}_w .$$

In some of the literature (*e.g.*, Charette and Meng, 1994, and Dooley, 1996), wage rates are predicted with the inverse Mill's ratio included in the wage equation. For the sake of comparison, we will estimate welfare participation using predicted wage rates both with and without the inverse Mill's ratio included.

E.2 Results

In this section we predict the wage rate using the two-step Heckman method. The results are presented separately for eligible single persons, all single persons, eligible

[3] Christofides et al. (1997) predicted the wage rate for non-workers without the inverse Mill's ratio because its negative parameter (α_3) made the predicted wage rate unreasonably high.

single parents and all single parents. The predicted wage rates obtained from the estimations in this section will be used in the welfare participation equations (equations (3.22), (3.24) and (3.25)).

i) Eligible Single Persons

The estimates of the parameters from the LF_i^* and the ln (w_i) equations for the eligible single person sample are shown in Table E.2. The number of eligible single persons who work ($LF_i = 1$) is 6,815 and the number of those who do not work ($LF_i = 0$) is 6,178. The reference case for both equations in Table E.2 is a single female who is older than 56 years, is not a member of a visible minority, lives in Ontario and who has 0-8 years of education.

The results for the LF_i^* equation (column LF in Table E.2) show that the dummy variables representing age and education are all positive. Other things being constant, an individual who is younger than 56 or who has more than 8 years of education is more likely to work than the reference case. The coefficients for the provincial dummy variables, except Prince Edward Island, are all negative and significant. In all age groups, individuals who live in Ontario are more likely to work than those who live in other provinces. Single males are less likely to work. Being a member of a visible minority does not effect the probability of working among low-income single individuals. A higher unemployment rate results in lower job opportunities and a lower probability of working.

The estimated parameters on the interaction terms between age and education dummy variables indicate that the effect of education on the probability of working depends on age, whereas the interactions between the province and education dummy variables indicate that it also depends on province of residence.[4] Most of the estimated coefficients associated with the interaction of age and education are significant (at the 10 percent level). The estimated coefficients associated with the interaction of education and province of residence variables are significant in most cases for Alberta and British Columbia, but insignificant in all cases for Quebec. This means that the effect of education on the probability of working for single persons differs between Western and Eastern Canada. Finally, there is a seasonal effect in the labour force participation equation. Eligible single individuals are more likely to work between August and December than in March.

In summary, the probability of working for eligible single persons depends on age, education, gender, and job opportunities. Individuals who live in different provinces have different probabilities of working. These differences are obvious when comparing individuals with the same level of education in Eastern and Western Canada.

The parameter estimates for the wage rate equation are shown in column ln(w) in Table E.2. Other things being constant, eligible individuals who are younger than 27 years and who have 0-8 years of education have the lowest wage rate. Single males tend to have lower expected wage rates than females. Individuals who are members of a visible minority have a lower expected wage rate, perhaps due to discrimination in occupational choice. In addition, the estimated parameters associated with the interaction of age and education and of province and education are significant.

---

[4] Some of the interactive variables NFE3, NFE4, NF37, ALTAE7 are deleted because they result in perfect collinearity between variables.

Lastly, the estimated coefficient on $\hat{\lambda}_i$ is positive and significant. This implies that there is a positive correlation between the probability of working and the wage rate. The estimated parameters of the wage equation are used to predict the wage rate for non-workers and for workers who have an hourly wage rate below \$3. The average predicted wage rate for these workers is \$4.6 when the inverse Mill's ratio is included in the wage prediction and \$5.2 when the inverse Mill's ratio is not included. For all eligible single persons, the average expected wage is \$6.0 and \$6.3 with and without the inverse Mill's ratio included in the wage rate prediction, respectively.

ii) All Single Persons

Table E.3 shows the results of the LF_i^* and the $\ln(w_i)$ equations for all single persons. There are 6,178 non-workers and 38,022 workers in this sample.

As was found with eligible single persons, younger and more educated single persons are more likely to work. Single males are less likely to work than single females. This result is hard to explain, but was also obtained using the eligible single person sample. Being a member of a visible minority does not affect the probability of working. A higher unemployment rate decreases the probability of working since it reduces job opportunities. However, the effects of the province dummy variables in this sample set differ from those in the eligible single person sample.

The interactions of age and education are mostly significant at the 10 percent level. The interactions of some province and education dummy variables are significant. However, the number of significant interactions of province and education variables is smaller than in the sample of eligible single persons.

The results from the wage rate equation are in column ln(w) in Table E.3. It suggests that individuals who are younger than 56 and who have more than 8 years of education have a higher wage rate. Individuals with a university degree have the highest wage rate. Single males tend to have a higher wage rate than single females. Individuals who are members of a visible minority have a lower wage rate. A higher unemployment rate has a negative effect on the wage rate. The interactions between age and education, and between province and education have significant effects on the wage rate. Finally, the estimated coefficients on monthly seasonal effects show that the wage rate in November and December tend to be lower than in other months. The inverse Mill's ratio ($\hat{\lambda}_i$) is positive and statistically significant, as was found using the sample of the eligible single persons.

The average wage rates with and without the inverse Mill's ratio included in the wage rate prediction are $10.65 and $11.45, respectively. These values are higher than those in the eligible single person sample, probably because workers constitute a larger proportion of all single persons than of eligible single persons.

iii) Eligible Single Parents

The estimated parameters of the LF_i^* and the $\ln(w_i)$ for eligible single parents are shown in Table E.4. The reference case is a single mother who is older than 56, not a member of a visible minority, who has 0-8 years of education and who lives in Ontario.

The results from the labour force participation equation show that having more children and having young children prevents single parents from working. For all provinces, a single father who is a member of a visible minority is more likely to work.

As in the single person case, a higher unemployment rate reduces the probability of working.

The estimated coefficients on the interaction of age and education and on province and education are mostly statistically significant.[5] Lastly, the seasonal dummy variables are deleted since they are all statistically insignificant.

The results from the wage rate equation show that individual characteristics are significant determinants of the wage rate. Younger single parents who have a university degree tend to have a higher wage rate. Single fathers tend to have a higher wage rate than single mothers. Single parents who are members of a visible minority get a lower wage rate. A higher unemployment rate increases the expected wage rate of single parents. This result is contrary to the prediction. The interactions between age and education and between province and education indicate that the effects of education on wage rate vary significantly across age and province. Lastly, the inverse Mill's ratio $(\hat{\lambda}_i)$ is positive but insignificant.

The average expected wage rate for non-workers is $7 when the inverse Mill's ratio is included in the wage rate prediction and $7.2 when the inverse Mill's ratio is not included. Among all eligible single parents, the average expected wage rate is $8.4 both when the inverse of Mill's ratio is included and excluded from the wage rate prediction.

---

[5] In order to avoid perfect collinearity between regressors, the following interactive dummy variables are eliminated from the estimating equation: A47E3, A47E4, A47E7, NFE5, NFE6, PE4, PE5, and MNE6.

iv) All Single Parents

Table E.5 shows the results of the LF_i^* and the $\ln(w_i)$ equations for all single parents. The results are quite similar to those of the eligible single parent sample. Age, gender, education, province of residence, number of children, and being a member of a visible minority have a significant effect on the probability of working. However, seasonal influences have no significant impact on the probability of working among single parents.

The results in column ln(w) in Table E.5 suggest that age, education, and province dummy variables as well as their interactions are significant determinants of the wage rate for single parents. Single fathers tend to have a higher wage rate than single mothers. The wage rate tends to decrease for single parents who are members of a visible minority. The monthly seasonal effects show that the wage rate is lower during the period July to November. The inverse Mill's ratio is negative and statistically significant.

The expected wage rates with and without the inverse Mill's ratio included in the wage rate equation are $10.88 and $10.33, respectively. They are about $2 higher than those of the eligible single parent sample.

Table E.1 List of Variables in the LF and ln (w) Equations

Variables
Dummy Variables
Age group
AGE2 = 1 if individual is younger than 27 in 1990.
AGE27 = 1 if individual is 27-36 years of age in 1990.
AGE37 = 1 if individual is 37-46 years of age in 1990.
AGE47 = 1 if individual is 47-56 years of age in 1990.
AGE57 = 1 if individual is 57-65 years of age in 1990.
Education
EDUC1 = 1 if individual has 0-8 years of education.
EDUC2 = 1 if individual has some secondary education.
EDUC3 = 1 if individual completed high school.
EDUC4 = 1 if individual has some post-secondary education.
EDUC5 = 1 if individual has post-secondary cert. or diploma.
EDUC6 = 1 if individual has university degree.
EDUC7 = 1 if individual has trades cert. or diploma.
Gender
GENDER = 1 if individual is male.
Province of residence
NFLD = 1 if individual is living in Newfoundland.
PEI = 1 if individual is living in Prince Edward Island.
NS = 1 if individual is living in Nova Scotia.
NB = 1 if individual is living in New Brunswick.
QUE = 1 if individual is living in Quebec.
ONT = 1 if individual is living in Ontario.
MN = 1 if individual is living in Manitoba.
SASK = 1 if individual is living in Saskatchewan.
ALTA = 1 if individual is living in Alberta.
BC = 1 if individual is living in British Columbia.
Seasonal variables
JAN = 1 for observations in January.
FEB = 1 for observations in February.
MAR = 1 for observations in March.
APR = 1 for observations in April.
MAY = 1 for observations in May.
JUNE = 1 for observations in June.
JULY = 1 for observations in July.
AUG = 1 for observations in August.
SEP = 1 for observations in September.
OCT = 1 for observations in October.
NOV = 1 for observations in November.
DEC = 1 for observations in December.
Visible minority
VISMIN1 = 1 if individual has a visible minority identification (Chinese, East Asian, East Indian, Black, Arab, West Asian, South East Asian).

Table E.1 (Concluded)

Variables
Number of Children
OWNKD1 = number of own kids age 0-2.
OWNKD2 = number of own kids age 3-5.
OWNKD3 = number of own kids age 6-15.
OWNKD4 = number of own kids age 16-24.
Labour and Income Variables
LF = 1 if individual works and = 0 otherwise.
RWAGES = real actual wages.
W1 = imputed real wages with the inverse Mill's ratio included in wage prediction.
W2 = imputed real wages without the inverse Mill's ratio included in wage prediction.
Provincial-Related Variables
UNEMPR = the monthly unemployment rate.
Interactions of Dummy Variables
A2E2, A27E2, A37E2, A47E2 = AGE × EDUC2
A2E3, A27E3, A37E3, A47E3 = AGE × EDUC3
A2E4, A27E4, A37E4, A47E4 = AGE × EDUC4
A2E5, A27E5, A37E5, A47E5 = AGE × EDUC5
A2E6, A27E6, A37E6, A47E6 = AGE × EDUC6
A2E7, A27E7, A37E7, A47E7 = AGE × EDUC7
NFE2, NFE3, NFE4, NFE5, NFE6, NFE7 = NFLD × EDUC
PE1, PE2, PE3, PE4, PE5, PE6, PE7 = PEI × EDUC
NSE1, NSE2, NSE3, NSE4, NSE5, NSE6, NSE7 = NS × EDUC
NBE1, NBE2, NBE3, NBE4, NBE5, NBE6, NBE7 = NB × EDUC
QUE1, QUE2, QUE3, QUE4, QUE5, QUE6, QUE7 = QUE × EDUC
MNE1, MNE2, MNE3, MNE4, MNE5, MNE6, MNE7 = MN × EDUC
SASKE1, SASKE2, SASKE3, SASKE4, SASKE5, SASKE6, SASKE7 = SASK × EDUC
ALTAE1, ALTAE2, ALTAE3, ALTAE4, ALTAE5, ALTAE6, ALTAE7 = ALTA × EDUC
BCE1, BCE2, BCE3, BCE4, BCE5, BCE6, BCE7 = BC × EDUC

Table E.2 The Wage Rate Estimation: Eligible Single Persons

Variable	LF equation			ln(w) equation		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
Constant	0.3761	2.772	0.01	1.6276	31.286	0.00
AGE2	2.0629	7.671	0.00	-0.1566	-1.731	0.08
AGE27	0.8076	5.274	0.00	0.2561	3.674	0.00
AGE37	0.3131	2.310	0.02	-0.0279	-0.422	0.67
AGE47	0.1889	1.861	0.06	0.1227	2.659	0.01
EDUC2	0.5110	3.692	0.00	0.1561	3.104	0.00
EDUC3	0.8889	5.892	0.00	0.2714	5.055	0.00
EDUC4	1.5886	8.887	0.00	0.4438	6.741	0.00
EDUC5	0.0079	0.050	0.96	0.3946	6.764	0.00
EDUC6	2.1082	12.020	0.00	0.1944	2.416	0.02
EDUC7	0.5373	2.497	0.01	0.4165	5.337	0.00
NFLD	-2.2928	-9.105	0.00	-0.6668	-4.206	0.00
PEI	0.2840	1.364	0.17	0.1174	1.819	0.07
NS	-1.0702	-5.232	0.00	-0.3110	-3.624	0.00
NB	-1.4185	-5.522	0.00	-0.0663	-0.540	0.59
QUE	-0.7825	-6.241	0.00	-0.0223	-0.391	0.70
MN	-0.6022	-2.113	0.03	-0.3050	-2.420	0.02
SASK	-0.4033	-1.643	0.10	-0.2421	-2.375	0.02
ALTA	-2.1818	-8.860	0.00	-0.2705	-1.715	0.09
BC	-0.5077	-2.002	0.05	-0.0955	-0.809	0.42
GENDER	-0.7029	-26.497	0.00	-0.0488	-2.093	0.04
VISMIN1	-0.0544	-0.788	0.43	-0.0410	-1.983	0.05
UNEMPR	-0.0408	-2.879	0.00	-0.0076	-2.055	0.04
A2E2	-1.4551	-5.102	0.00	0.1405	1.595	0.11
A27E2	-0.4838	-2.693	0.01	-0.1949	-2.628	0.01
A37E2	0.2573	1.509	0.13	0.1576	2.111	0.03
A47E2	-0.0464	-0.324	0.75	-0.0626	-1.057	0.29
A2E3	-1.9414	-6.601	0.00	0.1231	1.313	0.19
A27E3	-0.9338	-4.855	0.00	-0.2907	-3.748	0.00
A37E3	-0.6988	-3.699	0.00	0.0731	0.938	0.35
A47E3	-0.5497	-3.133	0.00	-0.1152	-1.820	0.07

Table E.2 (Continued)

Variable	LF equation			ln(w) equation		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
A2E4	-2.4270	-7.859	0.00	0.0271	0.270	0.79
A27E4	-1.5256	-6.961	0.00	-0.3060	-3.479	0.00
A37E4	-1.2539	-5.757	0.00	0.0713	0.832	0.41
A47E4	-1.0577	-5.083	0.00	-0.2835	-4.228	0.00
A2E5	-1.1777	-3.937	0.00	0.1935	2.098	0.04
A27E5	-0.2047	-1.021	0.31	-0.2486	-3.138	0.00
A37E5	0.2729	1.396	0.16	0.0594	0.708	0.48
A47E5	0.0094	0.052	0.96	-0.2792	-3.615	0.00
A2E6	-3.4474	-10.897	0.00	0.0829	0.672	0.50
A27E6	-2.0920	-10.034	0.00	-0.0317	-0.320	0.75
A37E6	-2.0598	-10.139	0.00	0.2610	2.583	0.01
A47E6	-1.2200	-6.011	0.00	0.2961	3.658	0.00
A2E7	-1.3917	-4.344	0.00	-0.1271	-1.235	0.22
A27E7	-0.6484	-2.755	0.01	-0.3713	-3.943	0.00
A37E7	-0.2395	-0.820	0.41	-0.5749	-4.286	0.00
A47E7	-0.3957	-1.896	0.06	-0.1475	-1.666	0.10
NFE5	3.4929	9.104	0.00	1.5504	8.078	0.00
NFE6	2.6717	5.421	0.00	1.4012	7.225	0.00
PE2	-0.3721	-1.857	0.06	-0.1224	-1.758	0.08
PE3	0.8345	3.324	0.00	-0.0040	-0.057	0.95
PE4	-0.0132	-0.059	0.95	-0.1600	-2.269	0.02
PE5	0.2586	1.217	0.22	-0.3274	-4.716	0.00
PE6	-0.0379	-0.116	0.91	0.0979	0.949	0.34
PE7	-0.4178	-1.191	0.23	-0.0326	-0.282	0.78
NSE2	0.4860	2.083	0.04	0.2997	3.289	0.00
NSE3	0.6823	3.053	0.00	-0.1651	-1.849	0.06
NSE4	0.0847	0.311	0.76	-0.0805	-0.772	0.44
NSE5	0.3556	1.557	0.12	-0.2745	-2.883	0.00
NSE6	0.3553	1.454	0.15	0.1070	1.121	0.26
NSE7	-0.1639	-0.550	0.58	-0.0761	-0.650	0.52
NBE2	0.0546	0.190	0.85	0.1882	1.312	0.19

Table E.2 (Continued)

Variable	LF equation			ln(w) equation		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
NBE3	0.5538	2.096	0.04	-0.3024	-2.335	0.02
NBE4	-0.7602	-1.910	0.06	-0.5556	-2.507	0.01
NBE5	0.7432	2.458	0.01	-0.7055	-5.195	0.00
NBE6	-0.2532	-0.826	0.41	1.1323	7.479	0.00
NBE7	0.5891	1.939	0.05	-0.3236	-1.812	0.07
QUE2	0.0035	0.025	0.98	-0.1341	-2.456	0.01
QUE3	-0.0052	-0.038	0.97	-0.2599	-4.842	0.00
QUE4	-0.1493	-0.956	0.34	-0.3740	-6.252	0.00
QUE5	0.1705	1.197	0.23	-0.3848	-6.626	0.00
QUE6	0.0392	0.252	0.80	-0.1209	-1.978	0.05
QUE7	0.1174	0.640	0.52	-0.1549	-2.215	0.03
MNE2	-0.5214	-1.609	0.11	-0.1316	-0.954	0.34
MNE3	-0.0783	-0.254	0.80	-0.0746	-0.571	0.57
MNE4	-0.6622	-2.153	0.03	-0.2912	-2.204	0.03
MNE5	-0.6457	-1.847	0.06	-0.3603	-2.317	0.02
MNE6	0.3477	1.023	0.31	0.1923	1.384	0.17
MNE7	-0.4395	-1.221	0.22	-0.0202	-0.138	0.89
SASKE2	-1.1183	-3.252	0.00	-0.1864	-1.139	0.25
SASKE3	-0.2881	-1.077	0.28	-0.3145	-2.903	0.00
SASKE4	-1.0868	-3.417	0.00	0.2795	2.116	0.03
SASKE5	0.0491	0.176	0.86	-0.3141	-2.772	0.01
SASKE6	0.3579	1.193	0.23	-0.4185	-3.649	0.00
SASKE7	-0.5435	-1.638	0.10	-0.1010	-0.742	0.46
ALTAE2	1.4064	5.272	0.00	0.1826	1.218	0.22
ALTAE3	1.1202	4.200	0.00	-0.1483	-0.997	0.32
ALTAE4	0.9391	3.466	0.00	-0.3364	-2.292	0.02
ALTAE5	1.3496	4.998	0.00	-0.4008	-2.376	0.02
ALTAE6	0.8164	2.971	0.00	0.5413	3.601	0.00
BCE2	0.1363	0.509	0.61	0.1363	1.139	0.25
BCE3	0.9979	3.802	0.00	0.2286	1.867	0.06
BCE4	0.4553	1.697	0.09	0.1610	1.336	0.18

Table E.2 (Continued)

Variable	LF equation			ln(w) equation		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
BCE5	0.6979	2.633	0.01	-0.0300	-0.247	0.81
BCE6	0.9529	3.515	0.00	0.2913	2.341	0.02
BCE7	0.2594	0.878	0.38	0.0636	0.503	0.62
JAN	0.0391	0.636	0.53			
FEB	0.0151	0.298	0.77			
APR	0.0077	0.152	0.88			
MAY	0.0155	0.287	0.77			
JUNE	-0.0126	-0.215	0.83			
JULY	-0.0148	-0.219	0.83			
AUG	0.1847	2.759	0.01			
SEP	0.1662	2.428	0.02			
OCT	0.1836	2.736	0.01			
NOV	0.1263	2.025	0.04			
DEC	0.1008	1.652	0.10			
$\hat{\lambda}$				0.2304	3.732	0.00
Observation	12993			6527		
Chi-squared	3984.44					
Adj R^2				0.3081		

The Prediction from the LF equation

Actual	Predicted		total
	0	1	
0	4149	2029	6178
1	1584	5231	6815
total	5733	7260	12993

Table E.2 (Concluded)

The Wage Rate Prediction from the ln(w) Equation

	Mean	Std. Dev.	Minimum	Maximum	Observation
All observations					
The actual wage rate[1]	3.719	5.150	0.000	90.320	12993
The predicted wage rate with $\hat{\lambda}$	5.947	4.143	1.789	90.320	12993
The predicted wage rate without $\hat{\lambda}$	6.277	4.089	1.789	90.320	12993
Observations with real wages below $3					
The predicted wage rate with $\hat{\lambda}$	4.563	1.957	1.789	22.397	6466
The predicted wage rate without $\hat{\lambda}$	5.227	2.133	1.793	24.806	6466
Observations with zero wages					
The predicted wage rate with $\hat{\lambda}$	4.478	1.922	1.789	22.397	6178
The predicted wage rate without $\hat{\lambda}$	5.221	2.152	1.793	24.806	6178

Note: [1] the real wage rate.

Table E.3 The Wage Rate Estimation: All Single Persons

Variable	LF equation			ln(w) equation		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
Constant	0.7327	7.905	0.00	1.5669	24.003	0.00
AGE2	1.3163	7.323	0.00	0.4436	5.452	0.00
AGE27	0.4442	4.861	0.00	0.1497	3.444	0.00
AGE37	0.5150	6.946	0.00	0.2680	6.609	0.00
AGE47	0.2191	3.530	0.00	0.1856	6.674	0.00
EDUC2	0.1411	1.507	0.13	0.1586	4.782	0.00
EDUC3	0.7650	7.623	0.00	0.4883	9.378	0.00
EDUC4	1.0216	7.612	0.00	0.5696	9.078	0.00
EDUC5	0.1848	1.800	0.07	0.5397	14.444	0.00
EDUC6	0.8664	7.368	0.00	0.8847	15.885	0.00
EDUC7	0.3553	3.038	0.00	0.6160	13.368	0.00
NFLD	-0.6803	-5.177	0.00	-0.4879	-8.899	0.00
PEI	-0.4405	-2.543	0.01	-0.5574	-7.713	0.00
NS	-0.5000	-3.933	0.00	-0.4183	-7.844	0.00
NB	-0.3928	-3.084	0.00	-0.3907	-7.676	0.00
QUE	-0.4719	-5.746	0.00	-0.2459	-6.003	0.00
MN	0.3250	2.149	0.03	0.0385	0.838	0.40
SASK	0.1435	1.030	0.30	0.0948	2.146	0.03
ALTA	-0.0643	-0.735	0.46	0.0150	0.573	0.57
BC	0.3434	2.661	0.01	0.5809	13.327	0.00
GENDER	-0.1846	-11.139	0.00	0.1203	14.666	0.00
VISMIN1	-0.0198	-0.440	0.66	-0.0224	-1.963	0.05
UNEMPR	-0.0249	-2.415	0.02	-0.0115	-3.706	0.00
A2E2	-0.8014	-4.160	0.00	-0.4661	-7.384	0.00
A27E2	0.2191	1.948	0.05	0.1424	3.395	0.00
A37E2	0.2203	2.133	0.03	0.2084	5.608	0.00
A47E2	0.2018	2.145	0.03	0.0897	2.457	0.01
A2E3	-1.4539	-7.393	0.00	-0.7546	-8.550	0.00
A27E3	-0.4667	-3.897	0.00	-0.1084	-2.259	0.02
A37E3	-0.4807	-4.287	0.00	-0.1011	-2.266	0.02
A47E3	-0.2779	-2.525	0.01	-0.0807	-2.203	0.03

Table E.3 (Continued)

Variable	LF equation			ln(w) equation		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
A2E4	-1.7277	-7.930	0.00	-0.8187	-8.212	0.00
A27E4	-0.7450	-4.858	0.00	-0.1349	-2.301	0.02
A37E4	-0.7319	-4.897	0.00	-0.0809	-1.456	0.15
A47E4	-0.3241	-2.154	0.03	0.0195	0.449	0.65
A2E5	-0.8103	-4.104	0.00	-0.5008	-7.315	0.00
A27E5	0.1745	1.452	0.15	0.0697	1.711	0.09
A37E5	0.0821	0.735	0.46	0.0325	0.900	0.37
A47E5	0.0921	0.833	0.40	-0.0963	-2.700	0.01
A2E6	-1.2505	-5.920	0.00	-0.6905	-8.292	0.00
A27E6	-0.4561	-3.396	0.00	-0.1951	-4.004	0.00
A37E6	-0.5877	-4.699	0.00	-0.1838	-3.849	0.00
A47E6	0.0892	0.682	0.50	0.0652	1.883	0.06
A2E7	-1.0291	-4.932	0.00	-0.7425	-9.627	0.00
A27E7	0.1561	1.161	0.25	0.0764	1.660	0.10
A37E7	0.4539	3.176	0.00	0.2193	4.925	0.00
A47E7	-0.2001	-1.632	0.10	-0.1562	-3.498	0.00
NFE5	1.7788	7.787	0.00	0.8362	10.472	0.00
NFE6	1.9189	8.208	0.00	0.7241	9.408	0.00
PE2	-0.0859	-0.497	0.62	0.1033	1.491	0.14
PE3	0.9091	4.304	0.00	0.5246	6.191	0.00
PE4	0.1744	0.902	0.37	0.1643	2.179	0.03
PE5	0.1969	1.050	0.29	0.0184	0.251	0.80
PE6	0.8750	3.574	0.00	0.5468	6.326	0.00
PE7	0.1488	0.502	0.62	0.0683	0.628	0.53
NSE2	0.3879	2.637	0.01	0.2378	4.286	0.00
NSE3	0.3549	2.513	0.01	0.1925	3.619	0.00
NSE4	0.2351	1.360	0.17	0.2077	3.502	0.00
NSE5	0.2557	1.831	0.07	0.2087	4.084	0.00
NSE6	0.5834	4.018	0.00	0.3036	5.262	0.00
NSE7	0.3827	2.483	0.01	0.0654	1.190	0.23
NBE2	-0.0995	-0.718	0.47	-0.0442	-0.878	0.38

Table E.3 (Continued)

Variable	LF equation			ln(w) equation		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
NBE3	0.1291	1.031	0.30	0.0664	1.425	0.15
NBE4	0.1087	0.733	0.46	0.0016	0.031	0.98
NBE5	0.9125	6.426	0.00	0.4931	7.893	0.00
NBE6	0.3513	2.757	0.01	0.5431	10.793	0.00
NBE7	-0.1355	-0.877	0.38	-0.1850	-3.168	0.00
QUE2	-0.0016	-0.017	0.99	-0.0504	-1.579	0.11
QUE3	0.2542	2.941	0.00	0.1539	4.314	0.00
QUE4	0.2234	2.245	0.02	0.0054	0.145	0.88
QUE5	0.4894	5.467	0.00	0.2336	5.501	0.00
QUE6	0.6748	7.319	0.00	0.4073	8.634	0.00
QUE7	0.1890	1.878	0.06	-0.0662	-1.828	0.07
MNE2	-0.3484	-2.012	0.04	-0.0607	-1.177	0.24
MNE3	-0.1984	-1.203	0.23	-0.0365	-0.774	0.44
MNE4	-0.9043	-5.347	0.00	-0.5404	-8.181	0.00
MNE5	-0.0473	-0.271	0.79	-0.0421	-0.887	0.38
MNE6	0.1058	0.582	0.56	0.2212	4.742	0.00
MNE7	-0.4506	-2.392	0.02	-0.3596	-6.291	0.00
SASKE2	0.1106	0.654	0.51	-0.0937	-1.925	0.05
SASKE3	0.0483	0.319	0.75	-0.0837	-1.850	0.06
SASKE4	0.0425	0.243	0.81	0.0123	0.249	0.80
SASKE5	0.0989	0.625	0.53	-0.1839	-3.998	0.00
SASKE6	0.3537	2.058	0.04	-0.0284	-0.616	0.54
SASKE7	-0.0430	-0.241	0.81	-0.3307	-6.222	0.00
ALTAE2	-0.0288	-0.261	0.79	-0.0187	-0.587	0.56
ALTAE3	0.2148	2.116	0.03	0.1025	3.371	0.00
ALTAE4	0.0616	0.559	0.58	0.0906	2.879	0.00
ALTAE5	0.2504	2.380	0.02	-0.0017	-0.055	0.96
ALTAE6	0.0924	0.880	0.38	0.0549	1.867	0.06
BCE2	-0.7031	-4.910	0.00	-0.6736	-11.858	0.00
BCE3	-0.1099	-0.800	0.42	-0.3933	-9.476	0.00
BCE4	-0.3581	-2.487	0.01	-0.4957	-10.697	0.00

Table E.3 (Continued)

Variable	LF equation			ln(w) equation		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
BCE5	-0.2218	-1.591	0.11	-0.5443	-12.642	0.00
BCE6	-0.0993	-0.686	0.49	-0.4808	-11.429	0.00
BCE7	-0.5069	-3.264	0.00	-0.7277	-13.467	0.00
JAN	-0.0137	-0.355	0.72	0.0252	2.462	0.01
FEB	-0.0032	-0.103	0.92	0.0013	0.159	0.87
APR	0.0147	0.463	0.64	0.0053	0.634	0.53
MAY	0.0444	1.307	0.19	0.0111	1.236	0.22
JUNE	0.0363	0.970	0.33	0.0044	0.445	0.66
JULY	0.0732	1.724	0.08	0.0002	0.022	0.98
AUG	0.0905	2.058	0.04	0.0045	0.391	0.70
SEP	0.0800	1.774	0.08	-0.0027	-0.231	0.82
OCT	0.0540	1.216	0.22	-0.0108	-0.933	0.35
NOV	-0.0056	-0.136	0.89	-0.0254	-2.371	0.02
DEC	-0.0531	-1.336	0.18	-0.0377	-3.475	0.00
$\hat{\lambda}$				1.1392	8.994	0.00
Observation	44200			37717		
Chi-squared	3263.774					
Adj R^2				0.3049		

The Prediction from the LF equation

Actual	Predicted		total
	0	1	
0	349	5829	6178
1	316	37706	38022
total	685	43535	44200

Table E.3 (Concluded)

The Wage Rate Prediction from the ln(w) Equation

	Mean	Std. Dev.	Minimum	Maximum	Observation
All observations					
The actual wage rate[1]	10.407	7.253	0.000	95.030	44200
The predicted wage rate with $\hat{\lambda}$	10.655	6.972	0.562	95.030	44200
The predicted wage rate without $\hat{\lambda}$	11.455	6.215	2.152	95.030	44200
Observations with real wages below $3					
The predicted wage rate with $\hat{\lambda}$	1.784	2.319	0.562	18.531	6483
The predicted wage rate without $\hat{\lambda}$	7.245	2.956	2.152	16.974	6483
Observations with zero wages					
The predicted wage rate with $\hat{\lambda}$	1.306	0.303	0.562	2.670	6178
The predicted wage rate without $\hat{\lambda}$	7.160	2.896	2.152	16.974	6178

Note: [1] the real wage rate.

Table E.4 The Wage Rate Estimation: Eligible Single Parents

Variable	LF equation			ln(w) equation		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
Constant	0.5980	3.476	0.00	2.340	33.083	0.00
AGE2	-0.1424	-0.766	0.44	-0.865	-10.210	0.00
AGE27	-0.6850	-3.932	0.00	-0.502	-5.916	0.00
AGE37	0.0480	0.298	0.77	-0.187	-2.669	0.01
AGE47	0.2325	1.382	0.17	-0.167	-2.503	0.01
EDUC2	0.3130	1.409	0.16	-0.549	-6.648	0.00
EDUC3	0.4243	2.806	0.01	0.040	0.850	0.40
EDUC4	0.2085	0.883	0.38	-0.115	-1.633	0.10
EDUC5	0.5197	1.728	0.08	-0.458	-5.162	0.00
EDUC6	0.1134	0.476	0.63	0.404	4.552	0.00
EDUC7	-0.1994	-0.807	0.42	-0.177	-2.000	0.05
NFLD	-0.6225	-3.233	0.00	-0.691	-10.058	0.00
PEI	0.5139	2.683	0.01	-0.173	-3.911	0.00
NS	0.1629	0.723	0.47	-0.307	-4.325	0.00
NB	0.0728	0.515	0.61	-0.254	-5.472	0.00
QUE	-0.6256	-5.267	0.00	-0.514	-11.334	0.00
MN	-1.0358	-5.659	0.00	-0.552	-6.555	0.00
SASK	-0.0096	-0.048	0.96	-0.225	-3.420	0.00
ALTA	0.4596	1.322	0.19	-0.549	-6.304	0.00
BC	1.0322	5.349	0.00	0.536	5.434	0.00
GENDER	0.1186	2.807	0.01	0.406	33.624	0.00
VISMIN1	0.2031	3.478	0.00	-0.094	-5.959	0.00
OWNKD1	-0.6319	-15.392	0.00			
OWNKD2	-0.3960	-12.297	0.00			
OWNKD3	-0.1055	-5.841	0.00			
OWNKD4	0.0244	1.039	0.30			
UNEMPR	-0.0306	-2.961	0.00	0.007	2.400	0.02
A2E2	-0.6823	-2.807	0.01	0.736	7.357	0.00
A27E2	0.6502	2.851	0.00	0.655	6.853	0.00
A37E2	-0.2062	-0.937	0.35	0.382	4.540	0.00
A47E2	-0.5358	-2.334	0.02	0.359	4.305	0.00

Table E.4 (Continued)

Variable	LF equation			ln(w) equation		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
A2E3	-0.0783	-0.398	0.69	0.410	5.643	0.00
A27E3	0.7880	5.156	0.00	0.201	3.130	0.00
A37E3	0.1504	1.095	0.27	-0.005	-0.102	0.92
A2E4	0.3534	1.297	0.19	0.246	2.520	0.01
A27E4	1.1402	4.802	0.00	0.185	2.125	0.03
A37E4	0.3968	1.736	0.08	0.104	1.470	0.14
A2E5	-0.1498	-0.436	0.66	1.072	9.414	0.00
A27E5	1.4032	4.440	0.00	0.924	8.796	0.00
A37E5	1.0506	3.370	0.00	0.708	7.607	0.00
A47E5	0.5211	1.578	0.11	0.683	7.378	0.00
A27E6	1.7142	5.992	0.00	-0.010	-0.093	0.93
A37E6	0.1826	0.735	0.46	-0.085	-0.916	0.36
A47E6	0.0621	0.231	0.82	-0.163	-1.785	0.07
A2E7	-0.4652	-1.600	0.11	0.344	2.923	0.00
A27E7	1.1428	5.262	0.00	0.121	1.400	0.16
A37E7	-0.3224	-1.328	0.18	-0.370	-5.026	0.00
NFE2	0.7849	4.361	0.00	0.441	6.484	0.00
NFE3	0.9437	4.270	0.00	0.405	5.372	0.00
NFE4	-0.1926	-0.855	0.39	0.716	8.054	0.00
NFE7	0.6773	2.729	0.01	0.892	9.833	0.00
PE2	-0.2923	-1.321	0.19	0.220	3.883	0.00
PE3	-0.3057	-1.509	0.13	-0.164	-3.379	0.00
PE6	-2.4395	-6.190	0.00	-0.311	-1.945	0.05
PE7	0.0492	0.174	0.86	0.429	5.096	0.00
NSE2	-0.1900	-0.787	0.43	0.217	2.727	0.01
NSE3	-0.4022	-1.682	0.09	-0.049	-0.652	0.51
NSE4	-1.1625	-3.960	0.00	0.235	2.239	0.03
NSE5	-0.5520	-1.884	0.06	-0.241	-2.766	0.01
NSE6	-0.9500	-2.946	0.00	0.482	4.249	0.00
NSE7	0.7092	2.223	0.03	0.660	6.046	0.00
NBE2	-0.0874	-0.566	0.57	-0.187	-3.590	0.00

Table E.4 (Continued)

Variable	LF equation			ln(w) equation		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
NBE3	-0.2487	-1.659	0.10	-0.176	-3.547	0.00
NBE4	-0.8467	-4.138	0.00	0.109	1.301	0.19
NBE5	-1.0459	-6.086	0.00	-0.095	-1.828	0.07
NBE6	-0.6762	-3.458	0.00	0.112	1.585	0.11
NBE7	-0.5204	-1.712	0.09	0.061	0.507	0.61
QUE2	0.2682	2.057	0.04	0.240	4.956	0.00
QUE3	0.1673	1.274	0.20	0.292	6.228	0.00
QUE4	0.0338	0.222	0.82	0.551	10.361	0.00
QUE5	-0.6645	-3.951	0.00	0.312	5.924	0.00
QUE6	0.6585	3.523	0.00	0.427	7.102	0.00
QUE7	0.3107	1.417	0.16	0.462	5.051	0.00
MNE2	0.6550	3.185	0.00	0.435	4.884	0.00
MNE3	0.8175	3.424	0.00	0.246	2.624	0.01
MNE4	0.8186	3.447	0.00	0.555	5.873	0.00
MNE5	1.1238	3.833	0.00	0.110	1.197	0.23
MNE7	2.3020	5.815	0.00	0.481	3.485	0.00
SASKE2	0.1687	0.777	0.44	0.053	0.737	0.46
SASKE3	0.1590	0.708	0.48	-0.092	-1.282	0.20
SASKE4	0.2871	1.216	0.22	0.301	4.101	0.00
SASKE5	-0.3036	-1.200	0.23	0.165	2.217	0.03
SASKE6	-0.3647	-1.453	0.15	0.454	5.466	0.00
SASKE7	0.6654	2.072	0.04	0.520	5.146	0.00
ALTAE2	-0.3316	-0.926	0.35	0.454	4.978	0.00
ALTAE3	-0.4758	-1.327	0.18	0.283	3.143	0.00
ALTAE4	-0.4158	-1.115	0.26	0.525	5.602	0.00
ALTAE5	-0.7912	-2.111	0.03	0.368	4.048	0.00
ALTAE6	-0.2278	-0.547	0.58	0.200	1.969	0.05
ALTAE7	1.3518	3.180	0.00	0.711	6.267	0.00
BCE2	-0.8519	-4.122	0.00	-0.457	-4.493	0.00
BCE3	-1.1030	-5.367	0.00	-0.644	-6.404	0.00
BCE4	-0.6271	-2.819	0.00	-0.604	-6.002	0.00

Table E.4 (Concluded)

Variable	LF equation			ln(w) equation		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
BCE5	-1.3873	-5.995	0.00	-0.658	-6.478	0.00
BCE6	-0.3196	-1.320	0.19	-0.596	-5.870	0.00
BCE7				-0.368	-3.141	0.00
$\hat{\lambda}$				0.013	0.368	0.71
Observation	13652			8790		
Chi-squared	3031.378					
Adj R^2				0.4112		

The Prediction from the LF equation

Actual	Predicted		total
	0	1	
0	2099	2664	4763
1	988	7901	8889
total	3087	10565	13652

The Wage Rate Prediction from the ln(w) Equation

	Mean	Std. Dev.	Minimum	Maximum	Observation
All observations					
The actual wage rate[1]	5.836	5.652	0.000	73.590	13652
The predicted wage rate with $\hat{\lambda}$	8.378	4.060	2.767	73.590	13652
The predicted wage rate without $\hat{\lambda}$	8.408	4.063	2.779	73.590	13652
Observations with real wages below $3					
The predicted wage rate with $\hat{\lambda}$	7.180	2.568	2.767	22.245	4862
The predicted wage rate without $\hat{\lambda}$	7.265	2.618	2.779	22.548	4862
Observations with zero wages					
The predicted wage rate with $\hat{\lambda}$	7.170	2.576	2.767	22.245	4763
The predicted wage rate without $\hat{\lambda}$	7.258	2.628	2.779	22.547	4763

Note: [1] the real wage rate.

Table E.5 The Wage Rate Estimation: All Single Parents

Variable	LF equation			ln(w) equation		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
Constant	0.7140	4.661	0.00	2.268	38.985	0.00
AGE2	-0.3094	-1.752	0.08	-0.599	-7.606	0.00
AGE27	-0.8137	-5.326	0.00	-0.166	-2.446	0.01
AGE37	-0.2610	-1.872	0.06	-0.005	-0.100	0.92
AGE47	0.0354	0.252	0.80	0.014	0.312	0.75
EDUC2	0.4084	2.058	0.04	-0.196	-3.025	0.00
EDUC3	0.5610	4.092	0.00	-0.022	-0.504	0.61
EDUC4	0.9427	4.525	0.00	0.021	0.355	0.72
EDUC5	0.4135	1.556	0.12	-0.222	-2.962	0.00
EDUC6	0.1296	0.552	0.58	0.635	7.922	0.00
EDUC7	0.0441	0.203	0.84	-0.425	-5.050	0.00
NFLD	-0.3055	-1.683	0.09	-0.310	-4.193	0.00
PEI	0.4244	2.229	0.03	-0.191	-3.456	0.00
NS	0.5344	2.674	0.01	-0.267	-4.022	0.00
NB	0.3264	2.447	0.01	-0.152	-2.804	0.01
QUE	-0.2746	-2.513	0.01	-0.297	-6.676	0.00
MN	0.0177	0.142	0.89	0.127	3.327	0.00
SASK	0.0748	0.392	0.69	-0.104	-1.522	0.13
ALTA	1.0659	3.619	0.00	-0.367	-5.517	0.00
BC	1.0581	5.897	0.00	0.548	6.293	0.00
GENDER	0.3719	10.112	0.00	0.429	40.111	0.00
VISMIN1	0.1116	1.973	0.05	-0.162	-10.162	0.00
OWNKD1	-0.6881	-17.270	0.00			
OWNKD2	-0.4948	-16.009	0.00			
OWNKD3	-0.2089	-12.279	0.00			
OWNKD4	-0.0941	-4.234	0.00			
UNEMPR	-0.0235	-2.399	0.02	0.003	0.747	0.45
A2E2	-0.7033	-3.096	0.00	0.408	4.391	0.00
A27E2	0.7130	3.522	0.00	0.164	2.126	0.03
A37E2	0.0538	0.277	0.78	0.079	1.239	0.22
A47E2	-0.5522	-2.747	0.01	-0.035	-0.552	0.58
A2E3	-0.2126	-1.129	0.26	0.374	4.809	0.00
A27E3	0.8200	5.856	0.00	0.152	2.547	0.01
A37E3	0.4101	3.276	0.00	0.056	1.352	0.18
A2E4	-0.2764	-1.119	0.26	0.120	1.323	0.19

Table E.5 (Continued)

Variable	LF equation			ln(w) equation		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
A27E4	0.5351	2.586	0.01	-0.038	-0.539	0.59
A37E4	0.0578	0.292	0.77	-0.022	-0.397	0.69
A2E5	0.1018	0.331	0.74	0.941	8.814	0.00
A27E5	1.7066	6.162	0.00	0.553	6.006	0.00
A37E5	1.4769	5.489	0.00	0.466	5.886	0.00
A47E5	0.9566	3.369	0.00	0.474	6.143	0.00
A27E6	1.7404	6.439	0.00	-0.274	-2.748	0.01
A37E6	0.7166	2.949	0.00	-0.228	-2.728	0.01
A47E6	0.6342	2.491	0.01	-0.226	-2.785	0.01
A2E7	-0.5709	-2.130	0.03	0.694	5.828	0.00
A27E7	0.8905	4.610	0.00	0.263	3.413	0.00
A37E7	-0.0346	-0.177	0.86	0.091	1.591	0.11
NFE2	0.4374	2.561	0.01	0.101	1.555	0.12
NFE3	0.6785	3.244	0.00	0.257	3.621	0.00
NFE4	-0.5408	-2.464	0.01	0.433	4.637	0.00
NFE7	0.3606	1.541	0.12	0.582	6.178	0.00
PE2	-0.3479	-1.551	0.12	0.260	4.105	0.00
PE3	-0.2883	-1.414	0.16	-0.064	-1.191	0.23
PE6	-1.4200	-4.850	0.00	0.158	1.742	0.08
PE7	0.0014	0.005	1.00	0.397	4.332	0.00
NSE2	-0.4242	-1.960	0.05	0.374	5.030	0.00
NSE3	-0.7434	-3.454	0.00	-0.010	-0.149	0.88
NSE4	-1.3215	-5.000	0.00	0.203	2.198	0.03
NSE5	-0.6207	-2.421	0.02	0.018	0.248	0.80
NSE6	-0.3008	-1.229	0.22	0.412	5.603	0.00
NSE7	0.2372	0.836	0.40	0.492	4.921	0.00
NBE2	-0.4261	-2.851	0.00	-0.251	-4.405	0.00
NBE3	-0.4998	-3.486	0.00	-0.141	-2.655	0.01
NBE4	-1.0109	-5.387	0.00	0.167	2.259	0.02
NBE5	-1.0910	-6.801	0.00	-0.014	-0.259	0.80
NBE6	-0.5575	-3.375	0.00	0.124	2.148	0.03
NBE7	-0.5380	-2.043	0.04	0.623	5.699	0.00
QUE2	0.0214	0.176	0.86	0.164	3.470	0.00
QUE3	-0.0465	-0.382	0.70	0.273	6.016	0.00
QUE4	-0.1967	-1.378	0.17	0.469	9.136	0.00

Table E.5 (Continued)

Variable	LF equation			ln(w) equation		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
QUE5	-0.5565	-3.727	0.00	0.283	6.030	0.00
QUE6	0.6484	4.153	0.00	0.225	4.489	0.00
QUE7	0.3301	1.665	0.10	0.629	7.152	0.00
MNE2	-0.1540	-1.016	0.31	-0.099	-2.068	0.04
MNE3	0.2002	1.103	0.27	-0.159	-3.180	0.00
MNE4	-0.0292	-0.153	0.88	-0.029	-0.506	0.61
MNE5	0.3049	1.248	0.21	-0.436	-9.050	0.00
MNE7	1.6685	5.291	0.00	0.123	1.369	0.17
SASKE2	0.2192	1.052	0.29	0.087	1.188	0.23
SASKE3	0.3141	1.472	0.14	0.007	0.101	0.92
SASKE4	0.3900	1.721	0.09	0.229	3.049	0.00
SASKE5	-0.2864	-1.188	0.23	0.100	1.332	0.18
SASKE6	-0.1482	-0.660	0.51	0.347	4.604	0.00
SASKE7	0.7716	2.528	0.01	0.471	4.465	0.00
ALTAE2	-0.8890	-2.901	0.00	0.345	4.790	0.00
ALTAE3	-0.9185	-3.003	0.00	0.270	3.893	0.00
ALTAE4	-0.6286	-1.973	0.05	0.514	7.109	0.00
ALTAE5	-0.9647	-3.017	0.00	0.396	5.723	0.00
ALTAE6	-0.3043	-0.886	0.38	0.385	5.277	0.00
ALTAE7	0.7659	2.046	0.04	0.599	6.349	0.00
BCE2	-0.8862	-4.544	0.00	-0.440	-4.836	0.00
BCE3	-1.1381	-5.893	0.00	-0.551	-6.188	0.00
BCE4	-0.7368	-3.485	0.00	-0.656	-7.332	0.00
BCE5	-1.3785	-6.322	0.00	-0.610	-6.779	0.00
BCE6	-0.6019	-2.659	0.01	-0.722	-8.052	0.00
BCE7				-0.514	-4.648	0.00
JAN				0.024	1.420	0.16
FEB				0.002	0.167	0.87
APR				0.001	0.103	0.92
MAY				-0.002	-0.123	0.90
JUNE				-0.007	-0.443	0.66
JULY				-0.032	-1.764	0.08
AUG				-0.034	-1.881	0.06
SEP				-0.031	-1.654	0.10
OCT				-0.036	-1.941	0.05

Table E.5 (Concluded)

Variable	LF equation			ln(w) equation		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
NOV				-0.033	-1.889	0.06
DEC				-0.026	-1.500	0.13
$\hat{\lambda}$				-0.186	-5.658	0.00
Observation	17085			12223		
Chi-squared	3031.378					
Adj R^2				0.4145		

The Prediction from the LF equation

Actual	Predicted		total
	0	1	
0	1788	2975	4763
1	772	11550	12322
total	2560	14525	17085

The Wage Rate Prediction from the ln(w) Equation

	Mean	Std. Dev.	Minimum	Maximum	Observation
All observations					
The actual wage rate[1]	7.774	6.953	0.000	73.590	17085
The predicted wage rate with $\hat{\lambda}$	10.878	5.547	3.060	73.590	17085
The predicted wage rate without $\hat{\lambda}$	10.326	5.298	3.060	73.590	17085
Observations with real wages below $3					
The predicted wage rate with $\hat{\lambda}$	10.950	4.680	4.181	42.993	4862
The predicted wage rate without $\hat{\lambda}$	9.012	3.159	3.909	30.473	4862
Observations with zero wages					
The predicted wage rate with $\hat{\lambda}$	11.002	4.699	4.181	42.993	4763
The predicted wage rate without $\hat{\lambda}$	9.013	3.170	3.909	30.473	4763

Note: [1] the real wage rate.