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AN ANALYSIS OF THE LABOUR FORCE BEHAVIOUR OF THE ELDERLY IN CANADA, 1980

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Résumé – Cette étude analyse le comportement de la population active des personnes âgées révélé dans le recensement de 1981. L'estimation économétrique des modèles de la participation à la population active, des taux de salaires, et de l'offre de travail tient compte du biais de sélection (procédure de Heckman) et du système de taxation sur le revenu. Les résultats indiquent des faibles effets de salaire et de revenu sur l'offre de travail des personnes employées. Ces facteurs économiques cependant ont une forte influence sur la décision de participation à la population active. Ces résultats corroborent ceux obtenus avec des échantillons de femmes mariées canadiennes et de personnes âgées américaines.

Abstract – This study investigates the labour force behaviour of elderly men and women in Canada using data from the 1981 census. In estimating the model of labour force participation, wage rates and labour supply (annual weeks and hours of work), the econometric technique uses the Heckman procedure to mitigate selection bias and incorporates the effects of the income tax system. The estimates show that, among those already working, there are small wage and income effects on labour supply. These economic factors, however, have strong influences on the labour force participation decision. These results are strikingly similar to those reported for Canadian married women and for American elderly men and women.

Key Words – **labour force behaviour, wage rates, elderly**

Introduction

Demographic trends in Canada, as in many other industrialized nations, indicate an increasingly older population that has important implications for economic and social policy. In 1961, the percentage of the Canadian population aged 65 and over was 7.6 per cent; by 1981, it was about 10 per cent. Recent projections by Stone and Fletcher (1986), who also present important stylized facts about the "seniors boom," show that almost 20 per cent of Canadians will be 65 and older by the year 2021, while those by Foot (1983) indicate that the population of Canada is expected to age as much over the next 20 years as it did over the previous 80 years.

This phenomenon of "population aging" will have a significant impact on the composition of Canada's work force, as the elderly are expected to constitute an ever-increasing proportion of the labour force. This changing demographic composition of the population is also likely to have an impact not only on the age distribution of the labour force, but also on the demand for part-time and full-time work.

In light of these population trends and their importance for social and economic policy, one would have expected a proliferation of research on the labour force behaviour of Canada's elderly. Yet, surprisingly, there are very few Canadian empirical analyses (see Breslaw and Stelcner, 1987; Daly and Wrage, 1981). In this study, we attempt to fill this research gap by analyzing the labour market behaviour of Canada's elderly using data from the 1981 census. We consider not only the question of whether a person is an employed wage earner, but also the labour supply of four population groups: unmarried (single and previously married) men, married men, single (never-married) women, and previously married women. For each group, the sample is restricted to those 50 to 74 years of age. Elderly married women are excluded from the analysis because of insufficient observations. Some evidence on their labour force behaviour is provided in Nakamura *et al.* (1979a, 1979b) and in Nakamura and Nakamura (1981).

In performing the empirical analysis, we use the Heckman (1980) technique to mitigate selection bias in the OLS estimates of the wage and labour supply functions. Also, we employ the iterative procedure of Nakamura and Nakamura (1981) to allow for the potentially important effects of the Canadian income tax/transfer system on labour force behaviour.

We begin with a brief review of the conceptual framework, followed by a discussion of the statistical model. The data and the variables are described in the third section of this paper, while the fourth section reports the empirical results. The final section contains the conclusions and provides some suggestions for extending the research.

Conceptual Framework

Our empirical analysis is guided by the standard neoclassical one-period model of labour supply in which (constrained) optimal choices of leisure and a composite good yield a labour supply (demand for "leisure") function which can be estimated. Lucid expositions of the basic theory are readily available in Killingsworth (1983) and in Nakamura and Nakamura (1981). In general form, a labour supply function may be written as $L = L(W_m, Z, V, \epsilon)$ where:

L = time devoted to market work
W_m = market or offered wage rate
V = nonlabour income, that is, income independent of market work
Z = a vector of socioeconomic characteristics
ϵ = unobserved "tastes" of the individual

The basic model is, of course, characterized by a number of well known simplifying assumptions. Among the more important ones are: (a) the individual – rather than the family – is assumed to be the decision making unit, so that the person's work decisions are made independently of those of other family members; (b) wages, nonlabour income, and prices are assumed to be exogenously determined; (c) the model does not recognize institutionally determined constraints on individual choices as to the amount of work – for example, individuals are allowed to supply the desired number of hours at the going market wage; (d) the model is a static one-period characterization of individual behaviour, so that it does not incorporate life-cycle aspects about considerations such as work, consumption, migration, marriage, fertility or intertemporal decision-making; and (e) the model does not allow for the effects of a system of income taxes (and transfers) on labour supply. That is, since such a system is likely to generate a nonconvex, nonlinear budget set, this complicates not only the optimization problem, but also the estimation technique because the (net) wage rate and (net) nonlabour income become endogenous. The potential effects of income taxes and transfers on labour supply are an important aspect of our analysis.

Recent theoretical and empirical research in labour economics has provided numerous elaborations, modifications and refinements of the basic labour supply model (see Killingsworth and Heckman, 1986; Lazear, 1986; and Pencavel, 1986). Although various econometric techniques have been devised for dealing with the above-mentioned complications, data considerations, especially in the Canadian context, often require that attention be restricted to the basic static one-period model. Notwithstanding its shortcomings, this frame-

work remains a useful one because it yields a set of empirically testable hypotheses that have considerable relevance for the formulation of economic and social policy. In particular, the conventional model makes a significant contribution in guiding empirical research and policy analysis by emphasizing the role that pecuniary factors (wages and nonlabour income) play in labour supply decisions. (See Osberg, 1986, for a comprehensive discussion of these issues in the Canadian context.) Much econometric research has been devoted to estimating labour supply elasticities, that is, the effects of changes in wages and nonlabour income on work decisions and, for those employed, on the amount of work.

This study maintains the basic conceptual framework, but extends it to take into account the effects of the Canadian income tax/transfer system on the elderly's labour supply behaviour. Our main focus is to assess the effects of pecuniary and other factors on the propensity by the elderly to work and, for those employed, on the amount of work.

Statistical Model

The conceptual framework summarized above can be readily translated into empirical representations of labour supply behaviour. In essence, a person's labour supply is determined by two behavioural equations: (1) a reservation or shadow wage function, W_r, and (2) a market or offered (gross) wage function, W_m. The former reflects the marginal value placed on nonmarket time; the latter indicates earnings potential as measured by a set of wage-determining attributes. Economic theory suggests that a person will enter the work force if ($W_m > W_r$) at zero hours of work and will adjust the amount of market work until the marginal value of time in market and nonmarket activities are equal, that is, market and shadow wages are equated at the margin. These wage functions may be expressed as follows:

$$\begin{aligned} Ln\ W_r &= \beta_0 + Z\beta_1 + \beta_2 V + \beta_3 Ln W_m + \beta_4 L + \epsilon_1 \text{ if } L > 0 \\ &= \beta_0 + Z\beta_1 + \beta_2 V + \epsilon_1 \text{ if } L = 0 \end{aligned} \tag{1}$$

$$Ln\ W_m = \alpha_0 + X\alpha + \epsilon_2 \tag{2}$$

where:

Z is a vector of variables affecting the reservation wage,

V is nonlabour income (plus income of other family members),
L is the amount of work,
X is a vector of market wage determining characteristics,
Z and X will, in general, have some elements in common.

The terms ϵ_1 and ϵ_2 are unobserved random errors with zero mean and are assumed to be uncorrelated with elements X and Z. As discussed in detail by Nakamura and Nakamura (1981:456-57), an interesting feature of the above model is that the reservation wage is an increasing function of the amount of market work and the market wage. This allows for an "income effect," associated with market wage changes, for those who perform market work. Of course, for nonworking individuals ($L=0$), this "income effect" disappears.

The condition for inclusion in the sample of workers, $W_m > W_r$, yields the reduced-form labour supply function:

$$L = \delta_0 + \delta_1 Ln\ W_m + Z\delta_2 + \delta_3 V + \epsilon^* \qquad (3)$$

where:

$$\delta_0 = -\beta_0/\beta_4,\ \delta_1 = (1-\beta_3)/\beta_4,\ \delta_2 = -\beta_1/\beta_4,\ \delta_3 = -\beta_2/\beta_4,\ \epsilon^* = -\epsilon_2/\beta_4$$

The effects of a progressive income tax system, where the marginal tax rate is t and $(1-t)$ is the marginal retention rate, on labour supply are captured by the net wage rate, $W_n = W_m(1-t)$, and by net nonlabour income at zero labour supply, $V_n = V(1-t)$, so-called "virtual" income. The concept of "virtual" or "imputed" income deserves a brief explanation. Essentially, it is the hypothetical nonlabour income at zero labour supply implied by a linear approximation of the piecewise linear budget set generated by a progressive income tax system. If, in the graphical version of the standard labour supply model, one introduces this budget set, "virtual" incomes are obtained by extending the budget constraint from the "kink" points to the vertical axis. The resulting intercepts of the budget segments with the vertical axis are "virtual" incomes. For explications, see Hausman (1985), Killingsworth (1983:332-34), and Moffitt (1983).

Although the gross wage rate, W_m, is assumed to be exogenous, the net wage rate and "virtual" income are endogenous. They are dependent (nonlinearly) on the amount of labour supplied via a tax function, $t = t(W_m\ L,\ V,\ X,\ Z)$. Thus, allowing for income taxes, the labour supply equation is:

$$L = \delta_0 + \delta_1 Ln\ W_n + Z\delta_2 + \delta_3 V_n + \epsilon^* \qquad (3')$$

As shown by Heckman (1980), conventional OLS estimation of the wage and labour supply functions on a subsample of workers may produce biased estimates of the parameters in both equations. (The reader may also wish to refer to Maddala, 1983, chapter 9, and Heckman, 1987, for a more detailed discussion of selection bias.) Essentially, this problem of selection bias arises because the subsample of workers (for whom wages and the amount of work are observed) is not randomly selected from the entire sample of workers and nonworkers. This yields systematic censoring of the subsample on which OLS estimation of the wage and labour supply equations is performed, and hence biased estimates. Following a procedure proposed by Heckman, this selection bias can be mitigated by first estimating a probit model which predicts inclusion in the wage earner sample, obtaining the inverse of Mills' ratio, λ, and then including this ratio as a regressor in each of the equations. The coefficient on λ in the wage equation is an estimate of the (normalized) covariance between the errors in the probit and wage regressions, that is, $(\sigma_{12}/\sqrt{\sigma_{22}})$, while in the labour supply equation, it indicates the correlation of unmeasured factors affecting the probability of being a wage earner and those determining the amount of work conditional upon working, that is, $(\sigma_{22}/\sqrt{\sigma_{22}})$. The variances and covariances of a bivariate normal population are σ_{11}, σ_{12}, σ_{22}.

As regards income tax effects, we follow the iterative procedure of Nakamura and Nakamura (1981), but we modify it to allow for both the endogeneity of the net wage rate and "virtual" income in the labour supply function. Nakamura and Nakamura (1981), allow only for the endogeneity of the net wage rate in their study. Although this omission is unlikely to alter their findings, incorporating the endogeneity of "virtual" income is more appropriate from the theoretical perspective (see Hausman, 1985). Also, we used both the federal and the provincial income tax returns for 1980 and material from the Canadian Tax Foundation (1981) for the tax calculations. A detailed summary of the tax/transfer system is available from the authors.

In sum, the estimation procedure is carried out as follows:

1. A reduced-form probit equation is first estimated for the entire sample of individuals in each group. The dependent variable is defined to be unity if the person was employed as a wage earner in 1980, and zero otherwise; the regressors are the vectors X, Z and V_n. The probit coefficients are then used to obtain a consistent estimate of the inverse of Mills' ratio, $\lambda = f(\phi)/F(\phi)$, for each individual. The expressions $f(\phi)$ and $F(\phi)$ are respectively the density and cumulative density functions of the standard normal distribution.

2. The wage equation is estimated on the subsample of workers using OLS, with λ as a regressor:

$$Ln\ W_m = \alpha_0 + X\alpha + (\sigma_{12}/\sqrt{\sigma_{22}})\lambda + \mu_1$$

The selection bias-corrected estimates are then used to obtain the imputed (gross) wage for workers and nonworkers.

3. By the use of λ obtained in step 1, the fitted gross wage from step 2, and the procedure of Nakamura and Nakamura (1981) to take account of income taxes, OLS estimation of the labour supply equation is also performed for each of the subsamples of workers in each population group:

$$L = \delta_0 + \delta_1 Ln\ W_n + Z\delta_2 + \delta_3 V_n + (\sqrt{\sigma_{22}})\lambda + \mu_2$$

4. We also estimate an "adjusted" probit using instrumental variable predictions of a person's net wage rate to examine more directly its impact on the likelihood of being a worker, as well as reservation wage factors. In doing so, the market wage regression is used to obtain a fitted gross wage for both workers and nonworkers, and the provisions of the income tax system, in turn, are used to obtain the imputed net or after-tax wage.

Data and Variables

The empirical analysis is based on data from the 1981 Census Public Use Sample Tape, Household/Family File (Statistics Canada, 1985). The sample is restricted to unmarried and married men and to single (never-married) and previously married (widowed, divorced or separated) women who were 50 to 74 years of age. Observations were discarded for any of the following reasons: (a) missing or inconsistent data on earnings or labour force activities, (b) immigrants who arrived after 1976, (c) those who spoke neither of Canada's official languages, and (d) residents of Prince Edward Island, the Northwest Territories and the Yukon because the Public Use Sample Tape grouped them in one category. A "participant" in this study is defined to be a person who was a wage and salary worker who reported positive earnings and positive amount of work in 1980. Those not in the labour force, unemployed or self-employed, are considered to be "non-participants." The 1980 unem-

ployment rate of the elderly was very low, about four per cent, and according to the census data, only a small proportion (about three per cent) of the elderly was self-employed.

This database is somewhat deficient for the estimation of annual hours labour supply equations. While data on labour earnings and on actual weeks worked are provided for the year 1980, continuous data on weekly hours worked are available only for the reference week ending June 3, 1981. Although a weekly wage can be readily obtained (by dividing annual earnings by annual weeks worked), to obtain an hourly wage, annual earnings must be divided by the product of weeks worked and hours worked in the reference week in 1981. This procedure may introduce measurement error, but since wage rates are used as instrumental variables in the labour supply equation, the problem is somewhat reduced (see Nakamura and Nakamura, 1981, 1983).

We estimate labour supply functions in which the amount of work is measured in two time-dimensions: annual hours and annual weeks worked. (Of course, the measure of labour supply in terms of annual hours may be subject to error if the hours worked in the reference week are not representative of the annual average.) As suggested by Hanoch (1980), this approach reflects the assumption that people are not necessarily indifferent to the allocation of yearly hours of work into annual weeks of work, and implies that the underlying utility function has two arguments for nonmarket time that may be imperfectly substitutable: "leisure" during nonworking weeks and "leisure" during working weeks. In this context, the annual hours of labour supply is a reflection of demand for the sum of both types of "leisure," while annual weeks worked is a reflection of demand only for "leisure" during non-working weeks. As Hanoch (1980:120) points out, "for example, one is not generally indifferent to a choice of working 100 hours weekly during 20 consecutive weeks (and staying off the labour market the rest of the year) or working 40 hours weekly during 50 weeks, though both supply an equal annual total of 2,000 hours of work." If individuals are not indifferent to the allocation of yearly hours into weeks, it is possible that the effects of explanatory variables will differ in the two specifications of the labour supply equations. We note, however, that Hanoch does not reject annual hours as an appropriate dependent variable for the labour supply equation.

To complement this approach, we also consider the possibility that weekly and hourly wage offers may differ. That is, employers may have different "preferences" for length of the work period (the hour, the week), so that the weekly wage rate equation may have a different structure than the hourly wage rate equation.

The explanatory variables are standard in the economics literature; for the most part, they require little comment. (The means and standard deviations of the variables used in the study are available from the authors.) For all demographic groups, in line with human capital theory, the market wage determinants are age, education, city size, region and internal migration. The number of children ever born is added as a proxy for breaks in work experience for previously married women. Marital status is included for unmarried men.

In the reduced-form probit equations, the variables include the set of market wage determinants as well as reservation wage factors, specifically, shelter costs, religion, net nonlabour income and, for previously married women, the age and composition of children living at home. In the "adjusted" probit equations, we use the fitted net wage as an instrumental variable. (We excluded the education and region variables because these variables were found to be collinear with the fitted wage.) The explanatory variables in the labour supply functions are city size, shelter costs, religion, the fitted net wage rate and "virtual" income. For previously married women, the number of children who live at home is added to the equation.

We now summarize our maintained hypotheses about the impacts of the market wage *(X)* and reservation wage *(Z)* factors on working. Our discussion is patterned after the clear and careful exposition by Nakamura *et al.* (1979a, 1979b) in their study of labour market activity of Canadian wives. Recall that a person (after taking account of income taxes) will work if the market wage exceeds the reservation wage (the value of nonmarket time) at zero hours of work, and, if the market wage exceeds the reservation wage, he/she will adjust the amount of work until the marginal value of nonmarket time is just equal to the marginal gain of an extra hour of market work.

As regards market wage determinants, the primary expectations are that the probability of working will increase with educational attainment and decrease with age. The place of residence variables (city size and region) serve as controls for regional differences in labour market and economic conditions. The migrant status of an individual may have either a positive or negative impact on working, depending on the reasons for migrating. If the reason for migrating is to accept a better job and if the individual is "achievement oriented," then the migration variable is likely to have a positive impact. However, if the individual was forced to give up a job or if he/she faces problems in acclimatizing to a new environment, then this will reduce the probability of working. For previously married women, the number of children ever born, the proxy for interruptions in work experience, is expected to lower the wage offered by employers, and hence the probability of working.

With respect to the reservation wage factors, a person is less likely to work the higher the after-tax nonlabour income (the "need" to work is lessened) and more likely to work the higher the shelter costs because of the need to meet these financial obligations.

The child status and religion variables are of particular interest and relevance for elderly women who are widowed, separated or divorced. Consider first the child status variables. It is now generally recognized in the empirical literature that the number and age composition of children living at home have significant effects on the mother's labour force behaviour (see Nakamura and Nakamura, 1981 and 1983; Smith and Stelcner, 1988; Stelcner and Smith, 1985; and Stelcner and Breslaw, 1985). Pre-school children and those attending school are likely to increase the value of nonmarket time (the reservation wage), thereby reducing the probability of working. As regards older children who live at home but do not attend school, one would expect their presence to reduce the reservation wage simply because these young adults obviously do not require "childcare" and because they are likely to share in various household chores, for example, cleaning, cooking and laundry.

The potential effects of religion on female labour force behaviour, as discussed in detail by Nakamura *et al.* (1979a), are indeed interesting. These variables proxy psychological costs that "reflect cultural and personal differences that make a women averse to, or fearful of, entering the labour force" (1979a:39). Using census data, previous studies on the labour supply of wives in Canada by Nakamura *et al.* (1979a, 1979b), Nakamura and Nakamura (1981, 1983), Stelcner and Smith (1985), and Smith and Stelcner (1988) have shown that religious affiliation does affect labour force behaviour. It would appear that the impact of religion on labour supply reflects "tastes" for and attitudes towards market work. Although it is difficult to assign any *a priori* expectation of its impact on wives' labour supply, Nakamura *et al.* (1979a) have suggested that to the extent that non-Protestant, especially Roman Catholic, women (or their families) have more conservative attitudes towards market work, the maintained hypothesis is that these women are less likely to work than their Protestant counterparts. In this study, we do not expect religion to have any effect on the work behaviour of men and single (never-married) women.

We now briefly describe how the explanatory variables are measured, bearing in mind the limitations of the 1981 census data. The effects of age are captured by four dummy variables (the reference category is age 50-54). As regards education, since a continuous measure of schooling was unavailable, we use seven education dummies (the excluded category is less than 9 years of schooling). City size is a dummy variable which takes a value of unity if the person lives in a labour market of more than 100,000 people (a Census

Metropolitan Area, CMA), zero otherwise. Region of residence is measured by four dummy variables (the reference category is British Columbia). Internal migration is measured by a dummy variable, unity if the person moved to a different province or census division between 1976 and 1981, zero otherwise. In the wage equation of previously married women, the number of children ever born is included to reflect hiatus in work experience, while that of unmarried men contains a dummy for previously married; the reference category is single.

As regards reservation wage determinants, religion, a "taste" variable, is measured by two dummy variables: Roman Catholic and "other" religions; the reference is Protestant. Shelter costs comprise annual outlays for electricity, heating, property taxes, municipal services, mortgage payments (owners) and rents (tenants). For previously married women, we assess the effects of children living at home by three variables: the number of children under age 24 at school, those in the same age bracket not at school, and those 24 years of age and over. Wage and income effects are reflected by the fitted net wage rate and by after tax nonlabour income (including that of other family members) at zero labour supply.

Empirical Results

Before considering the empirical results, we note a caveat. A full-fledged model of labour force behaviour of the elderly would allow for the endogeneity of current and, especially, past decisions about consumption, housing, work, migration, health, education, marriage and its dissolution, and fertility, *inter alia*. We recognize that the potential endogeneity of these factors, particularly for individuals late in the lifecycle, may produce biased estimates of the parameters. Unfortunately, practical difficulties stand in the way of a rigorous, let alone reasonable, evaluation of the direction and magnitude of these biases. To do this would ideally require panel data or, at minimum, retrospective information collected on a "recall basis" in cross-sectional surveys. The former type of data is simply not available in Canada, while the latter leaves much to be desired in the 1981 census. In short, with the cross-section data available to social scientists in Canada, it would appear impossible to expect any reasonable testing for the existence and correction of these biases. Nakamura and Nakamura (1985) provide an admirably lucid explication of the econometric and data issues.

Reduced-Form Probit and Wage Equations

Table 1 presents the reduced-form probit estimates for men. The signs and significance of the coefficients conform with the expectations of economic

TABLE 1. REDUCED-FORM PROBIT ESTIMATES OF PROBABILITY OF BEING A WORKER, MEN (DEPENDENT VARIABLE: WORKER = 1)

Explanatory Variables	NON-MARRIED MEN		MARRIED MEN	
CONSTANT	0.4273	(0.89)	1.0119	(5.34)
AGE 70-74	-3.1417	(6.19)	-2.9351	(18.53)
65-69	-1.5718	(4.39)	-2.4092	(17.49)
60-64	-0.9892	(2.97)	-0.9404	(7.60)
55-59	-0.6009	(1.77)	-0.3285	(2.53)
EDUCATION				
UNIVERSITY GRADUATE	1.0902	(1.75)	0.7578	(3.77)
SOME UNIVERSITY	1.2796	(2.02)	0.5664	(2.74)
OTHER NON-UNIVERSITY	1.3410	(3.51)	0.3923	(2.99)
TRADES CERTIFICATE	0.7227	(1.15)	0.3059	(1.86)
SECONDARY SCHOOL GRADUATE	0.4836	(1.25)	0.3717	(2.22)
GRADES 11-13	-0.0550	(0.14)	0.4897	(3.02)
GRADES 9-10	0.4423	(1.36)	0.1543	(1.23)
RELIGION				
ROMAN CATHOLIC	-0.0658	(0.24)	-0.0204	(0.20)
OTHER RELIGIONS	-0.1560	(0.46)	0.2362	(1.77)
WIDOWED, DIVORCED, SEPARATED	0.2790	(1.21)	-	-

INTERNAL MIGRANT 1976-81	-0.3400	(0.76)	-0.7321	(4.65)
PLACE OF RESIDENCE				
CENSUS METROPOLITAN AREA	0.2045	(0.89)	0.2570	(2.94)
ATLANTIC	-0.5684	(1.15)	-0.0473	(0.26)
QUEBEC	-0.4473	(1.20)	0.0739	(0.46)
ONTARIO	-0.0792	(0.23)	0.2397	(1.76)
PRAIRIES	0.3049	(0.74)	0.4000	(2.49)
PECUNIARY FACTORS				
SHELTER COSTS ('000)	0.2014	(2.84)	0.0990	(4.01)
NET NONLABOUR INCOME ('000) (at 0 labour supply)	-0.0686	(3.27)	-0.0205	(5.26)
Log likelihood function	-92.8766		-602.9820	
% 0 correctly predicted	88.5135		74.8418	
% 1 correctly predicted	83.7398		93.4177	
Mean of Dependent Variable	0.4539		0.6522	
Number of observations	271		1817	

Note: Numbers in parentheses are t-statistics.

theory. For both groups of men, increasing age and higher nonlabour income lower the probability of working. Shelter costs and education have positive impacts, with both effects somewhat more pronounced for married than for unmarried men. For married men only, residence in a large urban area and in the Prairies tends to increase participation as workers, while internal migration has a strong negative impact on the probability of working.

The selection bias-corrected wage regressions for men (Table 2) show that age does not have a statistically significant effect on the wage rates of elderly men. As regards schooling, only university graduation has a strongly significant positive effect on wage rates of unmarried men. For married men, however, increased schooling at all levels significantly increases market wage rates. The other explanatory variables do not have statistically significant effects, except for residence in the Atlantic provinces, which has a negative impact on wage rates of married men. The selection bias effect is negative and significant for married men only. This implies that working married men receive, on average, higher (offered) wages than men who are not wage earners with the same characteristics.

Table 3 presents the probit coefficients for women. The pattern of effects for both groups of women is generally the same, but a larger number of variables have significant impacts for previously married women. The coefficients show that women are less likely to work as they get older. The effect of schooling for previously married women is significantly positive at all levels of education, whereas only post-secondary education has a significant impact on the work decision of single women. For both groups of women, living in a CMA and higher shelter costs tend to increase participation as a wage earner, while a higher nonlabour income lowers the probability. The coefficients on the remaining variables are not statistically significant for single women.

As regards previously married women, the number of children ever born and internal migration have negative effects on the work decision, while residence in the Prairies and the presence of children under age 24 who are not at school, as well as those 24 years and over, have positive effects. With respect to effects of religion, Roman Catholic women in this group, as expected, are less likely to be wage earners. Our results for elderly women contrast with those found for prime-age Canadian wives (20-54 years) by Nakamura *et al.* (1979a, 1979b) and Nakamura and Nakamura (1983), who used the 1971 census and whose work was confirmed by Stelcner and Smith (1985) and Smith and Stelcner (1988) with the 1981 census. These studies report that married Roman Catholic women seem to have higher than average probabilities of working than wives who are not Roman Catholic. This study shows that previously married Roman Catholic women have lower than average probabilities of being workers.

The wage regressions for women are shown in Table 4. There are significant negative age effects for 65-69-year-old previously married women only in the weekly wage equation, whereas the effects for single women of the same age are positive in both wage equations. University graduation has a strong positive effect on the weekly and hourly wage for both groups of women. For previously married women only, residence in provinces other than British Columbia has a negative impact on wage rates; the effect is especially pronounced in the Atlantic region. The number of children ever born has a negative impact on the weekly wage rate, but its coefficient is not significant in the hourly wage equation. The selection bias term is negative and significant only in the weekly wage equation of single women.

Adjusted Probit Equations

Tables 5 and 6 present the adjusted probit estimates for men and women, respectively. Two sets of equations were estimated by including alternatively net hourly and net weekly wage rates. An attractive feature of the "adjusted" probit equation is that it indicates directly the impact of the after-tax market (offered) wage on the probability of being a wage worker.

For both groups of men, increased net wages and shelter costs have positive impacts on the work decision, while aging has a negative effect. There are some differences, however, between the two groups. For married men, the effect of nonlabour income and internal mobility is negative, while that of urban residence is positive. These variables, however, are not significant for unmarried men. The results for women are similar to those obtained for men. For both groups of women, residence in a CMA as well as increasing wages and shelter costs raise the probability of working, whereas higher nonlabour income, internal mobility, and increasing age lowers it. As regards religion, although previously married Roman Catholic women are less likely to work, religion does not have a significant effect on the work decision of single women, as expected. Finally, it is interesting to note that the child status variables do not have significant effects on the work decision in the "adjusted" probit for previously married women.

In sum, the "adjusted" probit estimates, by and large, confirm those of the reduced-form equation. The former estimates, however, are more revealing about the impact of the net market wage on the probability that a person will work for pay. It is noteworthy that the coefficient on this variable is strongly significant for both groups of men and women.

TABLE 2. MARKET WAGE REGRESSIONS, CORRECTED FOR SELECTIVITY BIAS, MEN

VARIABLES	NON-MARRIED MEN		MARRIED MEN	
Dependent ->	Weekly Wage Rate	Hourly Wage Rate	Weekly Wage Rate	Hourly Wage Rate
Explanatory				
CONSTANT	5.8732 (30.61)	2.2732 (12.75)	6.0749 (97.75)	2.3184 (35.73)
AGE 70-74	-0.3182 (0.43)	0.2726 (0.39)	-0.3146 (1.48)	0.0867 (0.39)
65-69	-0.3762 (1.43)	-0.2250 (0.92)	-0.0949 (0.60)	0.0514 (0.31)
60-64	-0.1005 (0.67)	-0.0503 (0.36)	0.0028 (0.06)	0.0143 (0.28)
55-59	0.0419 (0.33)	0.0116 (0.10)	-0.0382 (1.15)	-0.0052 (0.15)
EDUCATION				
UNIVERSITY GRADUATE	0.6141 (3.13)	0.5378 (2.95)	0.4769 (8.25)	0.5442 (9.01)
SOME UNIVERSITY	0.1346 (0.59)	0.0774 (0.37)	0.1659 (2.57)	0.2208 (3.28)
OTHER NON-UNIVERSITY	0.0781 (0.43)	0.0786 (0.47)	0.1714 (3.85)	0.2088 (4.48)
TRADES CERTIFICATE	0.0261 (0.10)	0.1377 (0.59)	0.1476 (2.77)	0.1294 (2.33)
SECONDARY SCHOOL GRAD	-0.0886 (0.47)	-0.1634 (0.93)	0.1468 (2.55)	0.2051 (3.41)
GRADES 11-13	0.0700 (0.39)	-0.0203 (0.12)	0.0404 (0.72)	0.1261 (2.14)
GRADES 9-10	0.0886 (1.06)	0.0476 (0.33)	0.0973 (2.09)	0.1494 (3.08)
WIDOWED, DIVORCED, SEP.	0.0908 (0.90)	0.0560 (0.60)	- -	- -

INTERNAL MIGRANT 1976-81	-0.0135	(0.06)	-0.1454	(0.75)	0.0948	(1.61)	0.0883	(1.44)
PLACE OF RESIDENCE								
CENSUS METROPOLITAN AREA	0.0687	(0.70)	-0.0371	(0.41)	0.0265	(0.89)	0.0068	(0.22)
ATLANTIC	-0.2351	(0.97)	-0.1527	(0.68)	-0.1827	(2.75)	-0.1511	(2.18)
QUEBEC	-0.0523	(0.32)	0.0276	(0.18)	-0.0630	(1.27)	-0.0373	(0.72)
ONTARIO	-0.0059	(0.04)	0.1033	(0.77)	-0.0662	(1.45)	-0.0341	(0.71)
PRAIRIES	-0.0989	(0.61)	0.0279	(0.19)	-0.0579	(1.08)	-0.0905	(1.61)
LAMBDA	-0.2303	(1.08)	-0.2142	(1.08)	-0.0413	(3.53)	-0.2235	(1.83)
$\bar{R}^2$	0.1928		0.1344		0.2172		0.1156	
F-Statistic	2.5341		1.9974		19.2529		9.5957	
Mean of Dependent Variable	5.8957		2.2784		6.0207		2.3830	
Standard Deviation	0.5587		0.5013		0.5188		0.5096	
Number of Observations	123		123		1185		1185	

Note: Numbers in parentheses are t-statistics and are appropriate only under the null hypothesis of no selection bias, and approximate otherwise.

TABLE 3. REDUCED-FORM PROBIT ESTIMATES OF PROBABILITY OF BEING A WORKER, WOMEN (DEPENDENT VARIABLE: WORKER = 1)

Explanatory Variables		SINGLE WOMEN		PREVIOUSLY-MARRIED WOMEN	
CONSTANT		-0.4592	(0.85)	-0.0527	(0.30)
AGE	70-74	-2.2911	(5.86)	-2.2343	(13.93)
	65-69	-1.4117	(4.18)	-1.4559	(11.34)
	60-64	-0.0941	(0.31)	-0.5752	(5.13)
	55-59	0.0995	(0.33)	-0.1193	(1.09)
EDUCATION	UNIVERSITY GRADUATE	1.9087	(4.27)	1.1049	(5.28)
	SOME UNIVERSITY	0.9287	(2.50)	1.1259	(6.99)
	OTHER NON-UNIVERSITY	1.3746	(4.12)	0.8062	(7.10)
	TRADES CERTIFICATE	0.1176	(0.16)	0.7170	(2.18)
	SECONDARY SCHOOL GRADUATE	0.1688	(0.51)	0.6168	(4.96)
	GRADES 11-13	0.2241	(0.45)	0.5417	(4.22)
	GRADES 9-10	0.3368	(1.02)	0.3144	(2.93)
NUMBER OF CHILDREN	EVER BORN	-	-	-0.0677	(3.71)
	LIVING AT HOME				
	< 24 ATTENDING SCHOOL	-	-	0.0958	(1.33)
	< 24 NOT AT SCHOOL	-	-	0.2715	(2.74)
	24 AND OVER	-	-	0.3621	(3.07)

RELIGION	ROMAN CATHOLIC	-0.0584	(0.19)	-0.1795	(1.97)
	OTHER RELIGIONS	-0.2215	(0.65)	-0.0493	(0.40)
INTERNAL MIGRANT 1976-81		-0.6545	(1.63)	-0.5285	(3.82)
PLACE OF RESIDENCE	CENSUS METRO AREA	0.5399	(2.48)	0.1880	(2.45)
	ATLANTIC	-0.0030	(0.01)	-0.0618	(0.37)
	QUEBEC	0.4466	(0.94)	-0.2099	(1.51)
	ONTARIO	0.4944	(1.24)	0.0478	(0.42)
	PRAIRIES	0.3464	(0.75)	0.3240	(2.40)
PECUNIARY FACTORS					
SHELTER COSTS ('000)		0.1924	(3.66)	0.0701	(3.64)
NET NONLABOUR INCOME ('000) (at 0 labour supply)		-0.1675	(6.67)	-0.0453	(7.06)
Log likelihood function		-108.1810		-804.4790	
% 0 correctly predicted		88.8889		91.4843	
% 1 correctly predicted		88.7006		60.4938	
Mean of Dependent Variable		0.4609		0.2511	
Number of observations		384		2258	

Note: Numbers in parentheses are t-statistics.

TABLE 4. MARKET WAGE REGRESSIONS, CORRECTED FOR SELECTIVITY BIAS, WOMEN

VARIABLES	SINGLE WOMEN				PREVIOUSLY-MARRIED WOMEN			
Dependent ->	Weekly Wage Rate		Hourly Wage Rate		Weekly Wage Rate		Hourly Wage Rate	
Explanatory								
CONSTANT	5.6093	(25.48)	1.8624	(9.06)	5.7852	(42.83)	2.0901	(15.62)
AGE 70-74	0.0343	(0.08)	0.1248	(0.30)	-0.0003	(0.00)	0.0021	(0.24)
65-69	0.4986	(2.37)	0.3738	(1.91)	-0.3160	(1.98)	0.0381	(0.24)
60-64	-0.0316	(0.31)	-0.1161	(1.22)	-0.0056	(0.07)	0.0567	(0.76)
55-59	0.0448	(0.49)	0.0068	(0.08)	-0.0227	(0.39)	0.0633	(1.11)
EDUCATION								
UNIVERSITY GRADUATE	0.5299	(3.51)	0.8974	(6.36)	0.7027	(5.46)	0.8147	(6.39)
SOME UNIVERSITY	0.4285	(2.89)	0.5354	(3.87)	0.1917	(1.65)	0.3152	(2.73)
OTHER NON-UNIVERSITY	0.1140	(0.84)	0.2655	(2.10)	0.0443	(0.47)	0.1106	(1.19)
TRADES CERTIFICATE	0.2124	(0.79)	0.2691	(1.07)	0.0386	(0.17)	-0.2004	(0.87)
SECONDARY SCHOOL GRADUATE	0.1938	(1.15)	0.2290	(1.46)	0.0502	(0.54)	0.0971	(1.06)
GRADES 11-13	0.2758	(1.24)	0.2755	(1.33)	-0.1219	(1.28)	-0.0418	(0.44)
GRADES 9-10	0.0937	(0.61)	0.2980	(2.09)	-0.0949	(1.15)	-0.0284	(0.35)

NO. OF CHILDREN EVER BORN	-	-	-	-	-	-0.0276	(2.12)	-0.0157	(1.22)
INTERNAL MIGRANT 1976-81	0.1642	(1.07)	0.0526	(0.37)		-0.1636	(1.68)	-0.3252	(0.84)
PLACE OF RESIDENCE									
CENSUS METROPOLITAN AREA	-0.0151	(0.15)	0.0157	(0.17)		0.0368	(0.71)	-0.0433	(0.84)
ATLANTIC	0.0965	(0.41)	0.3712	(1.68)		-0.2929	(2.69)	-0.3812	(3.54)
QUEBEC	0.0314	(0.20)	0.0836	(0.56)		-0.1581	(1.94)	-0.1319	(1.63)
ONTARIO	0.0144	(0.09)	0.0066	(0.05)		-0.2215	(3.28)	-0.2380	(3.56)
PRAIRIES	0.1211	(0.68)	0.0538	(0.32)		-0.2790	(3.49)	-0.1863	(2.35)
LAMBDA	-0.5049	(3.50)	-0.2231	(1.65)		-0.2031	(1.75)	-0.0030	(0.03)
$\bar{R}^2$	0.2498		0.3151			0.2372		0.1561	
F-Statistic	4.2556		5.4983			10.2616		6.5120	
Mean of Dependent Variable	5.7356		2.2296			5.3951		1.9718	
Standard Deviation	0.5626		0.5501			0.6073		0.5722	
Number of Observations	177		177			567		567	

Note: Numbers in parentheses are t-statistics and are appropriate only under the null hypothesis of no selection bias, and approximate otherwise.

TABLE 5. ADJUSTED PROBIT ESTIMATES OF PROBABILITY OF BEING A WORKER, MEN
(DEPENDENT VARIABLE: WORKER = 1)

Explanatory Variables	NON-MARRIED MEN				MARRIED MEN			
	Weekly Model		Hourly Model		Weekly Model		Hourly Model	
CONSTANT	-14.7171	(3.28)	-5.0211	(3.13)	-18.4238	(8.10)	-5.4259	(7.29)
AGE 70-74	-2.4296	(4.51)	-3.7573	(6.72)	-2.0840	(11.58)	-3.1212	(19.12)
65-69	-0.7406	(1.85)	-1.1199	(3.19)	-2.1384	(15.26)	-2.5054	(17.78)
60-64	-0.8001	(2.52)	-0.8888	(2.81)	-0.9253	(7.28)	-0.9620	(7.55)
55-59	-0.6510	(2.04)	-0.6010	(1.89)	-0.1907	(1.42)	-0.2748	(2.05)
INTERNAL MIGRANT 1976-81	-0.3160	(0.77)	0.0030	(0.01)	-0.9929	(6.06)	-0.9898	(6.02)
CENSUS METROPOLITAN AREA	0.0879	(0.41)	0.3570	(1.68)	0.2366	(2.73)	0.2630	(3.04)
WIDOWED,DIVORCED, SEPARATED	0.0652	(0.29)	0.1681	(0.76)	-	-	-	-
RELIGION								
ROMAN CATHOLIC	-0.1377	(0.58)	-0.1322	(0.55)	0.1074	(1.53)	0.1012	(1.07)
OTHER RELIGIONS	-0.1409	(0.45)	-0.0745	(0.24)	0.1912	(1.43)	0.1836	(1.36)

PECUNIARY FACTORS								
SHELTER COSTS ('000)	0.2094	(3.26)	0.2176	(3.34)	0.0967	(3.82)	0.0979	(3.83)
LN NET FITTED WAGE	2.7872	(3.42)	2.8977	(3.58)	3.5009	(8.68)	3.5236	(9.19)
NET NONLABOUR INCOME('000) (at 0 labour supply)	-0.0353	(1.73)	-0.0315	(1.52)	-0.0184	(4.72)	-0.0195	(4.94)
Log likelihood function	-99.7554		-99.1374		-582.9420		-577.8010	
% 0 correctly predicted	82.4324		83.1081		75.7911		77.5316	
% 1 correctly predicted	81.3008		84.5528		93.1646		93.3333	
Mean of Dependent Variable	0.4539		0.4539		0.6522		0.6522	
Number of Observations	271		271		1817		1817	

Note: Numbers in parentheses are t-statistics.

TABLE 6. ADJUSTED PROBIT ESTIMATES OF PROBABILITY OF BEING A WORKER, WOMEN
(DEPENDENT VARIABLE: WORKER = 1)

Explanatory Variables	SINGLE WOMEN				PREVIOUSLY-MARRIED WOMEN			
	Weekly Model		Hourly Model		Weekly Model		Hourly Model	
CONSTANT	-11.4014	(3.19)	-2.9843	(3.28)	-6.4941	(5.81)	-2.3115	(6.54)
AGE 70-74	-2.3117	(6.50)	-2.4431	(6.66)	-2.2629	(14.80)	-2.2600	(14.71)
65-69	-2.1679	(5.67)	-1.9167	(5.72)	-1.1658	(8.37)	-1.5715	(12.66)
60-64	-0.2725	(1.00)	-0.0725	(0.26)	-0.6298	(5.82)	-0.7072	(2.08)
55-59	-0.0562	(0.20)	0.0441	(0.16)	-0.1120	(1.60)	-0.2221	(2.08)
INTERNAL MIGRANT 1976-81	-0.9234	(2.31)	-0.7615	(1.96)	-0.3274	(2.45)	-0.0885	(0.63)
CENSUS METROPOLITAN AREA	0.5178	(2.59)	0.5232	(2.58)	0.1958	(2.75)	0.2939	(4.12)
NO. OF CHILDREN LIVING AT HOME								
< 24 ATTENDING SCHOOL	-	-	-	-	0.0434	(0.65)	0.0283	(0.42)
< 24 NOT ATTENDING SCHOOL	-	-	-	-	0.0390	(0.42)	0.0256	(0.28)
24 AND OVER	-	-	-	-	0.1130	(1.00)	0.0960	(0.84)

RELIGION								
ROMAN CATHOLIC	-0.0613	(0.29)	-0.1141	(0.56)	-0.4197	(5.51)	-0.3910	(5.09)
OTHER RELIGIONS	-0.1219	(0.34)	-0.2101	(0.59)	-0.1294	(1.09)	-0.1511	(1.26)
PECUNIARY FACTORS								
SHELTER COSTS ('000)	0.1822	(3.77)	0.1724	(3.55)	0.0813	(4.43)	0.0758	(4.07)
LN NET FITTED WAGE	2.2217	(3.38)	2.0088	(4.21)	1.2979	(6.06)	1.6290	(7.65)
NET NONLABOUR INC('000) (at 0 labour supply)	-0.1270	(5.85)	-0.1309	(6.00)	-0.0265	(4.26)	-0.0258	(4.14)
Log likelihood function	-121.6520		-117.8950		-860.0460		-848.3860	
% 0 correctly predicted	86.9667		86.9565		91.1295		91.7800	
% 1 correctly predicted	89.8305		89.2655		56.6138		56.7648	
Mean of Dependent Variable	0.4609		0.4609		0.2511		0.2511	
Number of Observations	384		384		384		384	

Note: Numbers in parentheses are t-statistics.

Labour Supply Equations

The labour supply regressions presented in Table 7 for men and Table 8 for women show that the labour supply model, for those who work, has poor explanatory power. In studies of American elderly, Clark *et al.* (1984) and Solberg (1981) also found that their models of labour supply for workers have a lower overall explanatory power. This "poor" performance may simply reflect the fact that people are not free to work as much as they would like at the going market wage, for a variety of reasons: an employee may be required to work longer or shorter hours than he/she wishes, as condition of employment or because of labour legislation, collective agreements or unemployment. It is quite conceivable that individuals are confronted with a minimum, maximum or single fixed number of hours as part of the work contract (see Owen, 1979, for further discussion). In other words, most of the variability in labour force behaviour that is discretionary appears to be reflected in the decision to work rather than in the amount of work, for those already employed. If this is the case, the estimation of labour supply functions confronts (at least) two important econometric issues: there is an identification problem in that one may be estimating the demand for labour by employers rather than the labour supply of employees; the estimates may be biased because of measurement error in the dependent variable. Some confirmation that there are institutional constraints on the amount of work provided by an examination of the actual distributions of weeks and hours worked and by their means and standard deviations. We found a "clustering" of annual weeks (45 weeks) and annual hours (1600 hours). An important topic for future research is to examine the effects of these constraints on labour supply. However, we note that in a recent study, Kahn and Lang (1988) examined this issue using Canadian data on desired hours of work. They found that although labour supply estimates based on actual hours of work are biased upward, the bias is small. Bearing these considerations in mind, we now summarize the results.

For non-married men, none of the coefficients in the labour supply equation are statistically significant. For married men, the coefficients on the net fitted wage and urban residence are positive and significant, while, somewhat curiously, the coefficient on "other" religions is negative and significant. The own-wage elasticity of married men is 0.16 for the hourly wage rate and 0.19 for the weekly wage rate. The coefficients on the remaining variables are not statistically significant.

For previously married women, the only variable that has a significant effect on the labour supply is city size. For single women, only the net hourly wage rate has a negative and significant impact on the annual hours worked. The own-wage elasticity is -0.33.

Finally, we note that the coefficient on the selection bias term is negative and statistically significant in both types of labour supply equations of married men and single women, and in the annual hours labour supply equation of previously married women. This suggests that, for these groups, the unmeasured factors which affect work status are negatively correlated with unobservables affecting the amount of work. Hanoch and Honig also estimated a negative coefficient which they explain as follows: "Put differently, it seems that at these ages persons who are already retired would have worked more hours than the nonretired individuals, other conditions (including wage and income) being equal" (1983:146).

Summary and Conclusions

This paper estimated a model of labour supply for elderly (50-74 years of age) unmarried and married men and for single and previously married women using 1981 Canadian census data. We used the Heckman (1980) technique to correct for selection bias and the procedure of Nakamura and Nakamura (1981) to allow for the effects of income tax/transfer system on labour supply. The main contribution of the study is that it provides estimates of the impact of socioeconomic factors on (a) the probability that a person is employed as a wage earner, and (b) the amount of labour supplied for those who do work. This study represents the first attempt, as far as we know, to examine the determinants of labour force behaviour among Canada's elderly, allowing for the effects of the income tax/transfer system.

As regards the determinants of who works as a wage earner, the pattern of results appears, in general, quite similar for all groups studied. The estimates show that the work status of elderly men and women is strongly influenced by economic considerations. Increasing net market wages and shelter costs have positive impacts on the probability of working, whereas a rise in after-tax nonlabour income has the opposite effect. The findings are consistent with those of other studies based on U.S.A. data (see Hanoch and Honig, 1983).

Our analysis of the amount of work (for those already employed) indicates that neither unmarried men nor previously married women are sensitive to changes in economic factors. Employed single women and married men do adjust their labour supply to changes in net wages, but slightly. These wage effects (elasticities) are not strong: negative for single women (-0.33) and positive for married men (0.16 to 0.19). These estimates of weak labour supply responses to wage changes among the employed are very much in line with

TABLE 7. LABOUR SUPPLY REGRESSIONS, CORRECTED FOR SELECTIVITY BIAS, MEN

VARIABLES	NON-MARRIED MEN				MARRIED MEN			
Dependent ->	Annual Weeks		Annual Hours		Annual Weeks		Annual Hours	
Explanatory								
CONSTANT	37.4755	(1.15)	1509.8200	(2.29)	-2.6014	(0.20)	1381.0701	(5.24)
CENSUS METROPOLITAN AREA	1.1632	(0.73)	109.8300	(1.15)	1.9522	(4.10)	66.2250	(2.27)
RELIGION								
ROMAN CATHOLIC	2.1160	(1.20)	70.1440	(0.66)	-0.1028	(0.20)	30.1618	(0.95)
OTHER RELIGIONS	-0.5330	(0.24)	146.8020	(1.10)	-2.6818	(3.77)	-141.4960	(3.26)
PECUNIARY FACTORS								
SHELTER COSTS ('000)	0.7090	(1.68)	34.7237	(1.38)	0.1006	(1.01)	5.4682	(0.89)
LN NET FITTED WAGE	0.3042	(0.05)	15.4258	(0.05)	8.5964	(3.73)	284.4000	(2.13)
NET NONLABOUR INC('000) (at 0 labour supply)	0.1163	(0.76)	2.1444	(0.24)	-0.0298	(1.37)	-1.1744	(0.88)

LAMBDA	1.0797 (0.46)	-130.1050 (1.03)	-2.1272 (2.70)	-415.4200 (9.68)
$\bar{R}^2$	0.0050	0.0173	0.0607	0.1093
F-Statistic	1.0884	1.3071	11.9260	21.7486
Mean of Dependent Variable	45.4309	1758.1100	45.8405	1820.0000
Standard Deviation	9.6100	514.6560	8.0745	505.7150
Number of Observations	123	123	1185	1185

Note: **Numbers in parentheses are t-statistics and are appropriate only under the null hypothesis of no selection bias, and approximate otherwise.**

TABLE 8. LABOUR SUPPLY REGRESSIONS, CORRECTED FOR SELECTIVITY BIAS, WOMEN

VARIABLES	NON-MARRIED MEN				MARRIED MEN			
Dependent ->	Annual Weeks		Annual Hours		Annual Weeks		Annual Hours	
Explanatory								
CONSTANT	65.2275	(2.39)	2806.5200	(8.88)	26.6106	(2.02)	1675.7700	(6.64)
CENSUS METROPOLITAN AREA	-0.7405	(0.55)	-12.8200	(0.16)	2.2520	(2.60)	11.3130	(2.10)
NO. OF CHILDREN LIVING AT HOME								
< 24 ATTENDING SCHOOL	-	-	-	-	-1.0897	(1.60)	-38.8205	(0.94)
< 24 NOT ATTENDING SCHOOL	-	-	-		-0.4398	(0.39)	-27.2350	(0.39)
24 AND OVER	-	-	-	-	0.0026	(0.00)	-102.7980	(1.13)
RELIGION								
ROMAN CATHOLIC	-0.9595	(0.80)	-127.5810	(1.65)	0.6422	(0.70)	59.0275	(1.07)
OTHER RELIGIONS	0.1880	(0.10)	-75.5240	(0.61)	-0.0021	(0.00)	83.4281	(1.04)

PECUNIARY FACTORS								
SHELTER COSTS ('000)	0.0771	(0.26)	-14.4975	(0.82)	0.0945	(0.44)	5.4874	(0.42)
LN NET FITTED WAGE	-3.0713	(0.55)	-549.1740	(2.13)	3.3477	(1.33)	-28.9734	(0.20)
NET NONLABOUR INC('000) (at 0 labour supply)	-0.0082	(0.03)	7.0400	(0.40)	-0.0109	(0.13)	-0.6319	(0.12)
LAMBDA	-3.9130	(2.19)	-378.3880	(3.54)	-0.7911	(0.73)	-263.5130	(4.25)
$\bar{R}^2$	0.0290		0.1326		0.0169		0.0581	
F-Statistic	1.7516		1.3071		1.9739		4.4910	
Mean of Dependent Variable	46.2542		1639.8200		44.7160		1520.8500	
Standard Deviation	7.2870		475.7320		9.6677		596.0910	
Number of Observations	177		177		567		567	

Note: **Numbers in parentheses are t-statistics and are appropriate only under the null hypothesis of no selection bias, and approximate otherwise.**

those obtained in the recent labour econometrics literature. In their studies of married women in Canada, Nakamura and Nakamura (1981, 1983), Robinson and Tomes (1985), Smith and Stelcner (1988), Stelcner and Breslaw (1985), and Stelcner and Smith (1985) also obtain very small (in absolute terms) labour supply elasticities, as does Mroz (1987) in a recent study for American wives. Low elasticities are also reported by Clark *et al.* (1984), Solberg (1981), and Hanoch and Honig (1983) in their studies of American elderly men and women and in various studies of men in the U.S.A. and the United Kingdom (Killingsworth, 1983; Pencavel, 1986). For further commentary on this topic, small elasticity estimates, and empirical results for American men and married and unmarried women of various ages, see Nakamura and Nakamura (1985).

A striking feature of the Canadian findings for married women and the elderly is the similarity of the estimates of (small) labour supply elasticities across demographic groups. The set of Canadian estimates suggests this conclusion: changes in wage rates and nonlabour income – arising, say, from reforms of the income tax system and transfer programmes – are likely to have small impact on the amount of work by those already working.

The results of this and other Canadian studies also underscore the importance that changes in wages and nonlabour income are likely to have on the labour force participation of the elderly and of married women. Inspection of the probit estimates in this study shows that economic factors strongly influence the participation decision of elderly men and women. This suggests that the elderly will remain in the labour force longer if profitable job opportunities are available to them or if pensions and other government transfer payments are reduced. As the age distribution shifts towards an increasingly higher proportion of elderly in the population, policies intended to induce or discourage the elderly to remain in the labour force will have to focus on the magnitude of their behavioural responses to changes in pecuniary factors.

There are several important topics for future research in this area. Analysis of the impact of health on the labour behaviour of the elderly in Canada deserves high priority on an agenda for future research (see Breslaw and Stelcner, 1987). Unfortunately, information on health is not available in the census data. With respect to amount of labour supply, future research on whether people do in fact have unconstrained choices of work hours is likely to provide important insights into the labour force activities of the elderly and other demographic groups. Future studies may also wish to simulate the effects of various changes in private pension schemes, government transfer programmes, and the income tax system on the labour supply of the elderly.

In closing, the authors hope that this study will encourage social scientists in Canada to continue to fill the research lacuna in this area and to provoke

Statistics Canada to provide "better" data in the 1991 census. A useful and inexpensive first step would be to provide retrospective information on a "recall" basis regarding labour force behaviour, similar to the data provided on migration. Also, the provision of data on institutional constraints on hours of work and on "desired" hours of work, as well as on health status, would be very useful in facilitating research in the area of labour force behaviour.

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Disclaimer

The findings and interpretations are those only of the authors and should not be attributed to Concordia University, the World Bank, or the SSHRCC.

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