Job Opportunities, the Offered Wage, and the Labor Supply of Married Women

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The major difference between segmented labor market and human capital theories about the labor force behavior of women lies in the attention paid to micro vs. market-wide or macro variables. In a study such as James Heckman's (1976) which includes no market variables, the demand for the labor of married women in any given education-experience (and hence offered wage) class is implicitly assumed to be infinitely elastic. Thus the observed differences in the labor force behavior of individual women are attributed entirely to differences in supply characteristics such as education and child status. On the other hand in segmented labor force analyses, such as Barbara Bergmann's and Irma Adelman's study, the macro phenomenon of occupational segregation by sex is seen as the major factor affecting the participation, wage rates, and hours of work of women. These two types of studies lead to different explanations of why the labor force participation of women has increased in recent years. Different sets of government policies aimed at improving the labor force situation of women are also implied.

In this paper we present a model of the labor force behavior of married women in which both individual and family decision making, and macro labor market conditions are found to play important roles. An unemployment variable and an index summarizing the ratio of expected available local job slots for women to the potential female labor force population are incorporated into a marginal utility analysis of the labor force behavior of married women in Canada. The inclusion of the local opportunity for jobs variable is supported by detailed evidence on the labor force segregation of women in Canada. Consistent estimation results are presented for eleven age groups in a probit analysis of whether or not a married woman works, and for eight age groups in equations estimating the offered wage rates and annual hours of work of married women who do work.

One unexpected finding is that working wives in Canada tend to work fewer hours per year when paid more per hour. This is contrary to the findings of other researchers for the United States, and has important policy implications. Although it is possible that our results differ from those of other researchers solely because we have analyzed data for another country, we argue in Section V of this paper that the difference in results is more likely due to differences in the form in which the labor supply function for wives is estimated and the choice of the variables which are used to control for child status. Our resulting uncompensated wage elasticities of hours of work are shown to be very similar to those reported by other researchers for men.

The data base used in this study is the Family File of the first Public Use Sample to be made available from a Canadian census. Combined grouped R^2s are presented showing the extent to which our equations explain the observed macro variations in the labor force behavior of married women classified by various characteristics. Finally we use our estimated model to see what changes we would expect in the labor force behavior of a hypothetical 41-year-old wife living in a small city in New Brunswick given a variety of changes

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in her situation brought on by herself, her family, the government, or by particular types of economic development in New Brunswick. Substantial wage gains, leading to higher expected annual income levels with fewer hours of work, are found to result from more education, from legislation or changes in social attitudes leading to less occupational segregation by sex, or from selective economic growth within the present structure of labor market segregation. Higher expected income levels with more hours of work are found to result from reduced childbearing, or from reductions in the costs of child care.

I. The Model

Looking at the 1971 sample data for Canadian families we find that despite substantial differences in the mean hourly wage of the husband and other characteristics of families with and without working wives, the differences in the mean annual numbers of hours worked by the husbands in these two groups of families are negligible. In attempting to describe the short-run (annual) labor force behavior of the wife, therefore, it may be useful to treat the husband's hours of work (and hence his earned income) as given. We will view the household as maximizing a twice-differentiable quasi-concave conditional utility function $U(x,l;Z^*)$ subject to the income and time constraints,

$$(1)\qquad px = A + I + wh$$

$$(2)\qquad T = l + h$$

and $0 \leq h \leq T$, where x is a Hicksian composite good representing the consumption of all goods other than leisure, l represents the nonmarket time (hours of leisure) of the wife, h $(= T - l)$ represents the market time (hours of work) of the wife at offered (market) wage w, T is the total time available, p is the price of the Hicksian composite good, A is asset income, and I is the annual income of the husband. Denote Z^* to be a vector of constraints arising from previous choices, such as the number of children and education. Assuming that h is strictly less than T, the Lagrangean for this problem, for any given vector Z^*, is

$$V = U(x, T - h; Z^*) + \gamma h + \lambda(A + I + wh - px)$$

and the Kuhn-Tucker conditions are (1), (2), $\gamma \geq 0$,

$$(3)\qquad U_x - \lambda p = 0$$

$$(4)\qquad -U_l + \gamma + \lambda w = 0$$

$$(5)\qquad \gamma h = 0$$

where $U_x = \partial U/\partial x$ and $U_l = \partial U/\partial l$. Then rearranging (1) and (3) we get

$$(6)\qquad x = (A + I + wh)/p$$

$$(7)\qquad \lambda = U_x/p = [\partial U(x,T - h; Z^*)/\partial x]/p$$

From these last two equations it is seen that, given any offered wage w, in equilibrium λ is a function of h, p, $A+I$, wh, and Z^*. From (4) we also have that in equilibrium $\lambda = (U_l - \gamma)/w$. Thus $w = (U_l/\lambda) - (\gamma/\lambda) = w^* - (\gamma/\lambda)$ where the shadow price of a wife's time (asking wage),

$$(8)\qquad w^* = U_l/\lambda$$

depends on h, p, $A + I$, wh, and Z^* when $h > 0$ and[1] on p, $A + I$, and Z^* when $h = 0$. Since $\lambda > 0$ by (7), and since (5) implies $\gamma = 0$ if $h > 0$ and $\gamma \geq 0$ if $h = 0$, we have $w = w^*$ if $h > 0$ and $w \leq w^*$ if $h = 0$. One crucial aspect of this solution is that the wife's asking wage w^* depends on her income wh, which depends on her offered wage w. This is because the mechanism by which leisure is traded for the increased consumption of other goods is through the relaxation of the household budget constraint.

If we take the *log* of both sides of (8) and linearize it around Z_i^*, A_i, I_i, $ln\ w_i$, and h_i, for the ith married woman we get

$$(9)\quad ln\ w_i^* = \begin{cases} \beta_0 + Z_i^*\beta_1 + \beta_2 A_i + \beta_3 I_i + \beta_4\, ln\ w_i + \beta_5 h_i + \mu_i^* & \text{if } h_i > 0 \\ \beta_0 + Z_i^*\beta_1 + \beta_2 A_i + \beta_3 I_i + \mu_i^* & \text{if } h_i = 0 \end{cases}$$

where β_2 and β_3 are expected to be equal. The

[1] U_l is taken to be the left derivative of U with respect to l at $l = T$ (or at $h = 0$) since U_l is not defined for $l > T$. See also Heckman 1974, Appendix 1.

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variable p does not appear in (9) because it is assumed to be the same for all households. Although the wife's offered wage w is also a price variable, it cannot be ignored in this way since it differs systematically from one wife to another. We will assume that variations in the wife's offered wage w are explained by

$$\ln w_i = \alpha_0 + Z_i\alpha_1 + E_i\alpha_2 + \mu_i \tag{10}$$

where Z and E are vectors of personal and regional economic variables, respectively.

It is not possible in our model to uniquely determine the coefficients of the shadow price equation (9). However, we can estimate the following expression for the wife's equilibrium number of hours of work:

$$h_i = \frac{1}{\beta_5}[(1 - \beta_4)\ln w_i - \beta_0 - Z_i^*\beta_1 - \beta_2 A_i - \beta_3 I_i - \mu_i^*] \qquad \text{at } h_i > 0 \tag{11}$$

We will briefly discuss our choice of the variables defining the vectors Z^*, Z, and E.

II. Factors Affecting a Married Woman's Asking Wage (Z^*)

The greater the costs of working, the higher a wife's asking wage should be. As proxies for these costs we have included the number of children younger than 6, the number of children 6–14 years, and the product of these two variables. The interaction term is included to account for nonlinearities in the amount of time spent per additional child as both the number of children and the number of older children increase. In addition it is expected that the costs of a wife working will be higher the more hours she works.

The number of children ever born has been included as a proxy for basic feelings of couples about the advantages of family vs. market-oriented activities. We have also included a variable for whether or not the wife's religion is Roman Catholic and a variable for whether or not the wife lives in a French-speaking household.

A family's need for additional income should increase as income from other sources decreases and as financial obligations increase; and the wife's asking wage is expected to decrease as her family's need for additional income increases. We have included separate terms for the yearly employment income of the husband, the asset income of the family, and an interaction term constructed by adding these two income variables and dividing by the family size. The only variable acting solely as a proxy for financial obligations is the number of children 19–24 years attending school.

III. Factors Affecting a Married Woman's Offered Wage

The factors believed to affect the offered wage can be divided into two broad groups. The first consists of personal attributes of individual women. The second consists of characteristics of the labor market which affect the general levels of demand for workers of different types. Studies which incorporate variables from only the first of these two groups provide insight into the question of which women will work given the labor market conditions, but may be unable to explain variations in the overall level of the employment of women over time or from one locality to another.

A. *Personal Characteristics (Z)*

The personal characteristics considered in this study are similar to those included in previous studies, and are influenced by the availability of data. A wife's offered wage is expected to be higher the more education she has and the longer she waited to get married. The number of children younger than 6 is included as a proxy for the recentness of woman's potential job experience. Finally, rather than guessing at how age affects offered wages, we have carried out our analysis for several different age groups.

B. *Regional Economic Characteristics (E)*

When the unemployment rate is high more workers compete for each available job. Thus the offered wage rate should be driven downward. Similarly the offered wage rate should be lower in areas where there is a structural scarcity of jobs believed suitable for women.

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TABLE 1—OCCUPATIONAL CHARACTERISTICS OF THE CANADIAN LABOR FORCE

Occupation	Women as Percent of Total Workers			Provincial Low and High Percentages of Female Workers	Percentage Growth of Total Workers	1971 Distributions of Total Workers by Residence		1971 Distributions of Workers		
	1951	1961	1971	1971	1951-1971	Urban	Rural	Total	Female	Married Female
Managerial	8.7	10.4	15.7	14.5-20.0	-17.1	4.9	2.0	4.3	2.0	1.9
Natural Sciences	6.9	4.8	7.3	2.1-9.4	250.8	3.1	1.2	2.7	0.6	0.5
Social Sciences	27.8	29.4	37.4	34.4-45.6	272.9	1.1	0.4	0.9	1.0	0.8
Religion	39.7	28.9	15.7	8.3-31.1	-23.0	0.3	0.3	0.3	0.1	0.0
Teaching	67.2[a]	64.4[a]	60.4[a]	57.8-71.5	200.4	4.2	3.5	4.1	7.1	7.4
Medicine	68.5[a]	72.1[a]	74.3[a]	71.1-78.2	193.9	4.2	2.1	3.8	8.2	7.9
Artistic	30.7	31.2	27.2	18.5-31.6	124.1	1.1	0.4	0.9	0.7	0.6
Clerical	56.1[a]	61.0[a]	68.4[a]	58.9-74.1	119.6	18.3	7.4	15.9	31.8	31.1
Sales	33.3[a]	32.0[a]	30.4[a]	25.2-38.5	165.2	10.4	6.0	9.5	8.4	9.0
Service	45.1[a]	46.7[a]	46.2[a]	37.2-54.9	91.8	11.9	8.8	11.2	15.1	14.2
Farming	3.9	11.7	20.9	12.5-24.2	-38.3	1.1	24.0	6.0	3.6	4.8
Other Primary	0.1	0.3	1.3	0.4-2.6	-28.8	1.1	4.5	1.8	0.1	0.0
Processing	14.8	13.7	17.8	11.3-43.3	-13.2	3.8	4.4	3.9	2.0	2.2
Machining and Fabricating	18.0[a]	17.9[a]	18.7[a]	3.0-25.2	32.1	10.8	8.0	10.2	5.5	6.3
Transport	0.5	0.6	2.4	0.8-3.5	22.2	3.7	4.7	3.9	0.3	0.3
Other	16.3	13.6	15.7	4.4-19.2	153.3	5.8	4.8	5.6	2.6	2.7
Unknown	20.6	26.0	43.4[a]	37.7-45.2	1044.5	8.4	9.4	8.5	10.8	10.0
All Occupations	22.0	27.3	34.3	27.6-35.8	62.8					

Source: Calculated from the *1951 Census of Canada*, Vol. IV, Table 4; *1961 Census of Canada*, Vol. III, Part I, Table 6; *1971 Census of Canada*, Vol. III, Part 2, Tables 2 and 8.
[a]More than 5 percent of the female labor force was in this occupation in the given year.

For instance, it has been argued that rural areas, and particularly rural nonfarm areas, have few jobs for women. In such areas the offered wage rate for women may normally be so low that many decide not to even look for a job.

Looking at females as a percent of total workers in each of the major occupational classifications, we find a great deal of consistency over time for Canada, and from one province to another in the same time period.[2] These percentages for 1951, 1961, and 1971 for Canada,[3] together with the provincial extremes for 1971, are shown in columns 1–4 in Table 1. For instance, we see that women generally have made up 40 percent or more of the total work force in the Teaching, Medi-

[2]The finding that women are occupationally segregated is not new. See Edward Gross, Valerie Oppenheimer, Abbott Ferris, and Bergmann and Adelman for *U.S.* studies, and Sylvia Ostry and Morley Gunderson for Canadian studies. Moreover Oppenheimer presents detailed evidence showing that the personal and family characteristics used as explanatory variables in most studies of the labor force behavior of women simply cannot account for the observed rise since World War II in their labor force participation.

[3]Occupational comparisons between 1951, 1961, and the 1971 Canadian censuses are difficult to make because of changes in the occupational classification scheme. We made these comparisons by going back to the dictionary definitions of each of the minor occupational codes for 1951 and 1961, and reordering these into the 1971 major occupational groupings. A complete description of how this reclassification was carried out is available on request from Cullen.

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TABLE 2—RATIOS OF EXPECTED JOBS FOR WOMEN TO NUMBER OF WOMEN 15 YEARS OF AGE AND OLDER, BY PROVINCE AND PLACE OF RESIDENCE FOR 1971

	By Occupation			
	Urban		Rural	
Province	30,000 and Over	Under 30,000	Nonfarm	Farm
Newfoundland	.45	.34	.20	.19
Nova Scotia	.50	.38	.29	.30
New Brunswick	.48	.39	.28	.29
Quebec	.42	.35	.26	.17
Ontario	.49	.41	.35	.26
Manitoba	.50	.41	.32	.18
Saskatchewan	.48	.39	.27	.15
Alberta	.51	.43	.32	.17
British Columbia	.45	.40	.36	.33

Source: Calculated from *1971 Census of Canada*, Public Use Sample Tape–Individual File.

cine, Clerical, and Service occupations, and 10 percent or less of the total work force in the Natural Sciences, Other Primary, Construction, and Transport occupations. Moreover, from column 5 we find that in general women are represented most heavily in the occupations which have grown more rapidly than the mean rate for all occupations.[4]

In 1951, 61.6 percent of all people and 64.8 percent of all married women in Canada lived in urban places of residence. The comparable figures for 1971 are 76.1 and 77.9 percent, respectively. Columns 6 and 7 of Table 1 show that, compared with rural areas, urban areas have higher percentage concentrations of workers in occupations which employ larger percentages of women. Thus, along with the growth over time in job opportunities for women, there has also been a shift in the percent of the population living in places offering relatively more job opportunities for women. Table 2 shows the expected numbers of jobs per woman, by province and place of residence. The expected numbers of jobs for women in each occupation, in each province and place of residence, are calculated by multiplying the 1971 Canada-wide percentages of women in each occupation by the actual number of workers in each occupation, in each province and place of residence. These expected numbers are summed over all occupations in each province and place of residence, and the resulting totals are then divided by the total number of women 15 years and older in each province and place of residence.

In our study each married woman is assigned the average 1970 unemployment rate for her province, and an appropriate value from Table 2 of the local opportunity for jobs index. A rural area dummy variable has also been included.[5]

IV. Estimation of the Model

The equations of interest in our study are

$$(10)\qquad \ln w_i = \alpha_0 + Z_i\alpha_1 + E_i\alpha_2 + \mu_i$$

$$(11')\qquad h_i = \frac{1}{\beta_5}[(1-\beta_4)\ln w_i - \beta_0 - Z_i^*\beta_1 - \beta_2 A_i - \beta_3 I_i] + v_i^*$$

[4]This finding is not new either. See Victor Fuchs, p. 237.

[5]The above discussion concerns the occupational segregation of all women, not married women. This is because comparable figures for workers classified by marital status as well as sex are not available for 1951 and 1961. However, from the evidence presented for 1971 in columns 8–10 of Table 1, it would appear that our generalizations about the occupational segregation of all women are equally valid for married women considered by themselves. Subsequent to developing our opportunity for jobs index we found that William Bowen and T. Aldrich Finegan (pp. 772–76) calculated a similar index for the United States which differs from ours in that the denominator of their index for each geographical region is the total civilian employment, rather than the potential female labor force as in the case of our index. For purposes of examining the wage rate and labor force behavior of married women we feel that our index is more appropriate, although use of either index probably would represent an improvement compared with the common practice in cross-sectional labor force studies of ignoring labor market conditions.

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where $v_i^* - = -(1/\beta_5)\mu_i^*$. We assume the covariance structure:

$$E(\mu_i) = E(v_i^*) = 0$$

$$E(\mu_i, \mu_j) = \begin{cases} \sigma_1^2 & \text{if } i = j \\ 0 & \text{otherwise} \end{cases}$$

$$E(\mu_i, v_j^*) = \begin{cases} \sigma_{12} & \text{if } i = j \\ 0 & \text{otherwise} \end{cases}$$

$$E(v_i^*, v_j^*) = \begin{cases} \sigma_2^2 & \text{if } i = j \\ 0 & \text{otherwise} \end{cases}$$

We observe values of w_i only for those women who worked for pay in 1970 (i.e., $h_i > 0$). Hence we need to include terms in (10) and (11′) to correct for selection bias, as suggested by Heckman (1976). (See also Reuben Gronau, 1973, 1974, and H. Gregg Lewis.) Assuming a joint normal distribution of μ_i and v_i^* the selection biases for (10) and (11′) are $E(\mu_i | h_i > 0) = (\sigma_{12}/\sigma_2)\lambda_i$ and $E(v_i^* | h_i > 0) = \sigma_2\lambda_i$, respectively, where $\lambda_i = f(\phi_i)/F(\phi_i)$ and $f(\phi)$ and $F(\phi)$ are the density and cumulative density functions of the standard normal distribution. The denominator of λ_i is the probability that observation i has data for the offered wage rate w_i. Moreover the lower the probability that an observation has data for w_i, the greater the value of λ for that observation. (See Heckman, 1976, p. 479.) The ϕ_i, and hence the λ_i, are derived by probit analysis as follows. From our maximization problem we have

$$P(D_i = 1) = P(h_i > 0) =$$
$$P(ln\ w_i - ln\ w_i^* |_{h_i=0} > 0) =$$
$$\frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\phi_i} e^{(-t^2/2)}\, dt$$

where D_i is defined to be one or zero depending on whether or not the ith married woman works. From equations (9) and (10) it can be shown that

$$(12) \quad \phi_i = \frac{1}{\sigma} [(\alpha_0 - \beta_0) + Z_i\alpha_1 - Z_i^*\beta_1 + E_i\alpha_2 - \beta_2 A_i - \beta_3 I_i]$$

where σ^2 is the variance of the random term $\mu_i - \mu_i^*$. Probit analysis gives estimates for the coefficients $(\alpha_0 - \beta_0)/\sigma$, α_1/σ, $-(\beta_1/\sigma)$, α_2/σ, $-(\beta_2/\sigma)$, and $-(\beta_3/\sigma)$, which in turn can be used to calculate ϕ_i and λ_i for the ith married woman.

After estimating the probit coefficients from the entire sample of married women, we used a two-stage generalized least squares (GLS) procedure[6] to estimate the following regression equations for $ln\ w_i$ and h_i using the subsample of married women who actually worked:

Offered wage equation:

$$(13) \quad ln\ w_i = \alpha_0 + Z_i\alpha_1 + E_i\alpha_2 + (\sigma_{12}/\sigma_2)\lambda_i + V_i$$

Hours equation:

$$(14) \quad h_i = \frac{1}{\beta_5} [(1 - \beta_4) ln\ w_i - \beta_0 - Z_i^*\beta_1 - \beta_2 A_i - \beta_3 I_i] + \sigma_2\lambda_i + V_i^*$$

where the covariance structure of V_i and V_i^* is shown to be $E(V_i^{*2}) = \sigma_2^2 M_i$, $E(V_i^2) = \sigma_1^2 (1-\rho^2) + \sigma_1^2\rho^2 M_i$, $E(V_i^*, V_i) = \sigma_{12} M_i$, $M_i = 1 + \phi_i\lambda_i - \lambda_i^2$, and $\rho = \sigma_{12}/\sigma_1\sigma_2$ (see Heckman, 1976).

The basic data for this study consists of the

[6]Since the disturbance terms V_i and V_i^* have heteroskedastic variances over a cross section of married women and since $ln\ w_i$ appears in (14) we used the following combination of two-stage least squares and GLS to estimate (13) and (14): (i) Use OLS to estimate the coefficients of (13). Then the variance of V_i is estimated as $a + bM_i$ where a and b are the estimated intercept and slope when the squares of the OLS residuals from (13) are regressed on M_i which is calculated for each married woman who worked. The GLS estimates are then found by applying weighted OLS to (13) using the estimated variances of the disturbance term, and predicted values are calculated for $ln\ w_i$. (ii) The predicted values calculated for $ln\ w_i$ in (i) are substituted for the actual values of $ln\ w_i$ in (14) and OLS estimates are obtained for this relationship. Then the variance of V_i^* is estimated as $s_2^2 M_i$ where s_2 is the OLS estimate of the coefficient of λ_i in (14) obtained from the first iteration, and GLS estimates are found for (14) by using weighted OLS with these estimated variances. In deriving GLS estimates for (13) and (14) the interequation correlation was ignored. The standard errors reported in this paper might be downward biased (see Heckman, 1977), but our substantive results appear to hold unchanged. Although expressions for adjusted standard errors are presented for both OLS and GLS estimates in Heckman (1977), the GLS expressions appear to be computationally intractable. Heckman himself resorts to OLS estimates in this paper despite his previous arguments (1974, 1976) about the importance of heteroskedasticity in his model.

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40,665 records for married couples living in Canada in households with no nonrelatives present which are contained in the 1 percent Family Public Use Sample from the *1971 Census of Canada*. These records were divided into eleven groups according to the age of the wife: 15–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, 60–64, and 65+. Estimation results for the probit coefficients and for the offered wage and hours of work equations are presented in the following section.

V. Empirical Results

Since our local opportunity for jobs index variable has not been used in other studies, we first estimated the probit coefficients for our model with and without this variable for the age groups 15–19, 20–24, and 25–29. The only significant differences between these two sets of estimates are that when the jobs index variable is included the coefficients for the rural area dummy decrease in absolute magnitude and are never significant at a

TABLE 3—PROBIT ESTIMATES FOR FINAL MODEL[a]

Explanatory Variables	Age Groups										
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+
Constant	-6.750	-1.541	-1.075	-.469	-.541	-.627	-1.073	-1.507	-1.762	-1.809	-1.658
	(6.18)	(4.75)	(4.18)	(2.01)	(2.57)	(3.14)	(5.50)	(7.46)	(7.64)	(5.83)	(4.65)
Education	.016	.054	.088	.059	.062	.058	.065	.062	.077	.064	.055
	(.52)	(6.05)	(12.15)	(8.47)	(8.90)	(8.29)	(9.27)	(7.88)	(9.15)	(6.65)	(5.34)
Number of children younger than 6	-.151	-.474	-.381	-.456	-.420	-.406	-.574				
	(.96)	(8.84)	(7.56)	(9.47)	(8.33)	(6.71)	(5.50)				
Number of children 6-14		-.142	-.130	-.126	-.096	-.157	-.151	-.094	-.109		
		(1.05)	(2.53)	(3.61)	(3.78)	(6.59)	(5.78)	(2.80)	(1.44)		
Product of number of children younger than 6 and number 6-14		.172	.119	.028	.046	.064	.146				
		(1.73)	(4.94)	(1.61)	(2.68)	(2.89)	(3.74)				
Number of children 19-24 attending school				-.434	.317	-.010	.082	.066	.253	.314	-.506
				(.88)	(2.64)	(.21)	(2.07)	(1.41)	(3.98)	(2.49)	(.95)
Number of children ever born			-.102	.001	.003	-.008	-.015	-.010	-.001	-.008	-.031
			(2.94)	(.04)	(.13)	(.48)	(1.09)	(.72)	(.10)	(.53)	(1.93)
Husband's income	-.00008	-.00016	-.00011	-.00008	-.00005	-.00003	-.00004	-.00003	-.00006	-.00001	.00005
	(.85)	(6.52)	(8.32)	(7.32)	(6.26)	(4.42)	(6.19)	(3.85)	(4.56)	(.54)	(1.60)
Asset income of family	-.00032	-.00011	-.00009	-.00007	-.00002	-.00001	-.00004	-.00003	-.00007	-.00007	-.00004
	(1.74)	(2.15)	(4.01)	(2.43)	(.91)	(.48)	(2.70)	(2.11)	(3.99)	(2.89)	(1.13)
Per person family income (excluding wife's earnings)	.00038	.00037	.00022	.00015	.00007	-.00001	.00003	.00002	.00007	.00003	-.00001
	(1.78)	(5.67)	(5.74)	(3.71)	(2.12)	(.46)	(1.38)	(.87)	(2.33)	(.66)	(.18)
Age at first marriage	.310	.057	.019	.006	-.011	-.008	.002	.012	.005	.004	-.012
	(5.32)	(4.26)	(2.15)	(.78)	(1.72)	(1.61)	(.54)	(2.79)	(1.09)	(.57)	(1.88)
Religion dummy	-.063	.034	.133	.148	.091	.070	-.023	-.112	.026	.033	.098
	(.47)	(.63)	(2.87)	(3.04)	(1.85)	(1.41)	(.44)	(1.82)	(.39)	(.39)	(.99)
Language dummy	.118	-.190	-.282	-.026	-.380	-.288	-.280	-.188	-.348	-.383	-.102
	(.62)	(2.79)	(4.81)	(4.25)	(5.83)	(4.46)	(4.05)	(2.42)	(3.93)	(3.43)	(.77)
Provincial unemployment rate	-.044	-.024	-.007	-.036	-.028	-.032	-.024	-.024	-.015	.011	-.025
	(1.17)	(1.62)	(.54)	(2.70)	(2.04)	(2.38)	(1.77)	(1.65)	(.94)	(.55)	(1.05)
Opportunity for jobs index	3.011	2.154	1.560	1.442	1.761	2.107	2.199	2.031	2.103	1.216	1.114
	(4.42)	(7.59)	(6.23)	(5.72)	(7.21)	(8.70)	(9.00)	(7.73)	(7.06)	(3.20)	(2.50)
Combined Grouped R^2 = .9072[b]											
Pseudo R^2	.20	.26	.24	.15	.12	.11	.12	.09	.09	.06	.03
Maximum R^2 for model	.75	.73	.75	.74	.74	.74	.74	.74	.72	.66	.43
Pseudo R^2 for model (Pseudo R^2 divided by maximum R^2 for model)	.28	.36	.32	.21	.16	.15	.17	.12	.13	.09	.08
Number in sample	607	4438	5541	4762	4613	4570	4476	3509	2941	2159	3049
Number who worked	328	2853	2651	1879	1755	1896	1900	1352	965	492	252
Proportion who worked	.54	.64	.48	.40	.38	.41	.42	.38	.33	.23	.08
Final value of log of likelihood function	-349	-2213	-3084	-2803	-2774	-2825	-2753	-2181	-1718	-1095	-816

Source: Calculations based on *1971 Census of Canada*, Public Use Sample Tape-Family File.

[a]Numbers in parenthese are (asymptotic) t-statistics. A coefficient is significant with at least a 95 percent level of confidence if its t-statistic is greater than or equal to 1.96.

[b]Explained in the text.

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TABLE 4—GENERALIZED LEAST SQUARES ESTIMATES FOR *Log* OF OFFERED WAGE EQUATION[a]

Explanatory Variables	Age Groups							
	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59
Constant	-.957 (4.25)	.331 (1.78)	-.058 (.25)	-.692 (1.99)	1.310 (5.69)	-1.228 (4.99)	-1.280 (2.36)	-1.632 (2.95)
Education	.039 (7.65)	.070 (14.98)	.070 (11.53)	.066 (9.97)	.045 (8.39)	.067 (12.28)	.060 (7.81)	.077 (8.39)
Number of children younger than 6	.011 (.20)	-.002 (.07)	.066 (1.70)	-.080 (1.83)	.026 (.45)	-.257 (2.59)		
Age at first marriage	.027 (4.68)	.008 (1.72)	.003 (.70)	.009 (1.79)	-.003 (.91)	.004 (1.24)	.004 (1.18)	.011 (2.82)
Provincial unemployment rate	.021 (2.53)	.001 (.15)	.005 (.41)	.004 (.30)	.013 (1.06)	-.005 (.44)	-.004 (1.66)	.009 (.55)
Opportunity for jobs index	.386 (2.15)	-.283 (1.56)	.466 (2.00)	.604 (2.40)	.279 (1.45)	1.135 (5.30)	1.334 (4.19)	1.192 (3.53)
Selection bias	.136 (.83)	-.235 (2.38)	-.177 (1.13)	.263 (1.49)	-.894 (4.86)	.659 (4.32)	.665 (2.46)	.409 (1.63)
Combined grouped R^2 = .7307[a]								
R^2	.20	.34	.21	.11	.15	.22	.10	.22
Standard error of regression	1.01	1.00	1.01	1.00	1.03	1.01	1.00	1.00

Source: See Table 3.
[a]See Table 3.

confidence level of even 80 percent, while the coefficients for the unemployment rate variable also decrease in both absolute size and significance. Thus we decided to carry out the rest of our study using a model in which the jobs index variable is included but the rural area dummy is not.

The probit coefficients for our final model are shown in Table 3 for all eleven age groups. Looking only at those coefficient estimates which are significant with a 95 percent level of confidence, we see that our hypotheses as summarized in Sections II and III of this paper are generally supported. Notice that the coefficients for the employment income of the husband and for the family asset income are negative, while the coefficients for the per person family income variable are generally positive. The implication is that the decline in the probability of a wife working as the income of the husband becomes larger, or the family asset income becomes larger, will be less steep the smaller the number of children. The only surprising finding in Table 3 is that Roman Catholic wives with childbearing patterns similar to other wives in their age group have higher than average probabilities of working.[7] Only wives living in French-speaking homes have below average probabilities of working, even after controlling for childbearing patterns.

Our estimation results for equations (13) and (14) are shown in Tables 4 and 5.[8] All coefficients significant at a 95 percent level have the expected signs, with the exception of the coefficient of the provincial unemployment rate in the offered wage equation. This may be due to the fact that wage rates for existing job slots are quite insensitive to unemployment rates. Also it may be that local

[7]This result is not believed to be due to multicollinearity with the dummy variable set equal to 1 if the language of the home is French. For the eleven age groups the correlation between these two variables are .51, .56, .57, .58, .59, .64, .65, .65, .67, and .70, respectively.

[8]The age groups 15–19, 60–64, and 65+ were dropped from this portion of the analysis due to the small numbers in these age groups of wives who actually worked, and other difficulties encountered in obtaining statistically meaningful results.

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TABLE 5—TWO-STAGE GENERALIZED LEAST SQUARE ESTIMATES FOR ANNUAL HOURS OF WORK EQUATION[a]

Explanatory Variables	Age Groups							
	20–24	25–29	30–34	35–39	40–44	45–49	50–45	55–59
Constant	1899.474 (13.88)	2308.443 (11.99)	1829.135 (6.75)	2022.421 (8.21)	2313.827 (8.08)	1655.294 (6.07)	1410.875 (2.49)	1582.385 (2.68)
Log of wife's offered wage	-263.476 (2.13)	-390.432 (3.17)	-202.650 (1.30)	-232.312 (1.56)	-394.536 (2.38)	124.296 (.69)	393.912 (1.11)	154.818 (.59)
Number of children younger than 6	-202.806 (4.02)	-196.178 (3.90)	-182.250 (2.25)	-202.102 (3.18)	-236.485 (3.79)	-188.922 (1.82)		
Number of children 6–14	-74.928 (.88)	-28.094 (.70)	-15.128 (.42)	-32.803 (1.24)	-57.749 (2.18)	-67.800 (1.91)	-50.518 (1.27)	-43.236 (.50)
Product of number of children younger than 6 and number 6–14	106.312 (1.75)	-2.127 (.11)	-15.201 (.98)	29.129 (1.84)	81.746 (3.99)	10.106 (.25)		
Number of children 19–24 attending school			-567.839 (1.24)	57.836 (.53)	15.070 (.35)	-5.737 (.15)	23.066 (.48)	37.649 (.46)
Number of children ever born		-3.502 (.13)	15.839 (.60)	-16.246 (.95)	-14.643 (1.09)	-6.616 (.54)	-21.621 (1.53)	-11.760 (.81)
Husband's income	-.038 (2.38)	-.030 (2.49)	-.062 (4.84)	-.019 (2.17)	-.022 (3.01)	-.030 (3.72)	-.040 (3.46)	-.025 (1.31)
Asset income of family	-.044 (1.57)	-.040 (2.10)	-.042 (1.78)	-.009 (.58)	-.019 (1.35)	-.029 (2.12)	-.040 (2.35)	-.036 (1.44)
Per person family income (excluding wife's earnings)	.098 (2.42)	.078 (2.47)	.163 (4.32)	.064 (2.08)	.048 (1.78)	.049 (2.36)	.081 (3.82)	.051 (1.41)
Religion dummy	64.904 (2.14)	33.859 (.97)	52.926 (1.13)	162.431 (3.48)	148.127 (3.32)	58.960 (1.28)	-12.027 (.19)	38.595 (.57)
Language dummy	10.987 (.28)	71.796 (1.47)	-40.528 (.75)	-59.122 (.68)	-49.944 (.73)	-71.612 (.90)	107.960 (1.19)	208.111 (1.56)
Selection bias	409.289 (4.72)	329.504 (3.04)	552.956 (3.44)	323.988 (2.74)	378.497 (3.26)	496.736 (4.24)	376.411 (2.20)	322.514 (1.76)
Combined grouped $R^2 = .9591^b$								
R^2	.03	.08	.05	.05	.07	.04	.04	.05
Standard error of regression	937	1091	1258	1329	1332	1294	1369	1471

Source: See Table 3.
[a]See Table 3.
[b]See Table 3.

rather than provincial unemployment rates, or female rather than general unemployment rates, should have been used in our analyses.[9] As is the case for Gronau's results, but in marked contrast to Heckman's (1976, 1977) results, we find the selectivity bias in the offered wage equation to be significant with at least an 80 percent level of confidence for all age groups except 20–24 and 30–34.

One reassuring observation is that the sign of the coefficient of the bias correction term λ in the hours of work equation is always positive as required by our model. This was true too for the initial *OLS* estimates. Also, as required by our model, we find that the coefficients of the husband's earned income and of the family asset income are approximately equal for all age groups in the hours of work equation.

[9]Local unemployment rates for Canada by province and place of residence are not available, however. Nor would rates calculated from the Public Use Sample be suitable either, as these would be for the week prior to when the 1971 Census was taken rather than averages for 1970.

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The negative coefficients of the offered wage rate variable for the five younger age groups, all significant at at least an 80 percent confidence level, come as a surprise, however, since other researchers have found the response of the wife's hours of work to her wage rate to be positive.[10] Heckman (1976), in fact, estimates a model in which this response must be positive on theoretical grounds. He argues that, "Historical time-series and cross-section studies suggest that there is a monotonic *positive* relationship between wage rates and labor supply for married women ... so that excluding the 'backward bending' case is not objectionable ..." (1974, p. 681).[11] Yet looking at historical data for Canada[12] we find that, while both real wages for women and the female labor force participation rate have clearly risen over time, the percent of all female workers working forty weeks per year or more has fallen from 74.4 percent in 1961 to 67.0 percent in 1971 and the percent of all female workers working thirty-five hours per week or more has fallen from 90.0 percent in 1951 to 81.7 percent in 1961 to 71.3 percent in 1971.

In our model the response of the participation rate to a change in the offered wage is expected (though not constrained) to be positive. However, the sign of the offered wage variable in our hours equation cannot be determined a priori. Rather this coefficient is expected to reflect the balance between the positive substitution effects of increases in the offered wage rate on the number of hours of work, and a secondary negative effect which comes about because the more a woman is paid per hour the more rapidly the household budget constraint will be relaxed as she increases her hours of work. Thus our empirical findings that an increase in the offered wage rate will increase the probability of a wife working, but decrease her expected annual hours of work if she does work, are compatible both with the assumptions of our model and the observed historical developments for Canada. Moreover we will now argue that the empirical findings in other cross-sectional studies of a positive relationship between the wage rates of wives and their hours of work are the result of certain differences between these previous studies and ours.

As Hall (p. 151) points out, the overall or unconditional labor supply function can always be written as the product of a function for the probability of participating in the labor force (or of working in our study) and a conditional labor supply function defined for

[10]See, for instance, Hall, Heckman (1974, 1976), and Harvey Rosen.

[11]Heckman in his 1976 and 1977 papers estimates a reduced-form equation for the annual number of hours worked in which the offered wage rate does not explicitly appear. He then infers the sign of the impact of the offered wage on the annual number of hours worked from the signs of the coefficients of those variables which are included in his hours equation. He is able to make this inference because in moving from the theoretical appendix to the body of his 1974 paper, he drops without comment the offered wage, along with the price vector p, from his asking wage function. In a later paper (1978), Heckman explains that the asking wage in his one-period models is independent of the offered wage by assumption. Thus the coefficient of the *log* of the offered wage rate in his study becomes the constant of proportionality $1/\beta_5$ in our hours equation (14), which must be positive in both his model and ours since it represents the rate at which the annual hours of work adjusts to positive discrepancies between the offered wage rate and the asking wage rate at zero hours of work. In our model, however, the offered wage rate has not been dropped out of the asking wage function. Thus the coefficient of the *log* of the offered wage in our hours equation is $(1/\beta_5)(1-\beta_4)$, as shown in Section. I.

[12]The numbers shown for the percentages of all female workers working forty weeks per year or more are calculated from the *1961 Census of Canada*, Volume II, Part 3, Table 22; and from the *1971 Census of Canada*, Public Use Sample–Individual File. The 1951 data on weeks worked are not comparable to the data for 1961 and 1971 since, in that year, part-time employment was converted to a full-time weekly basis. The data for both 1961 and 1971 are for wage and salary earners reporting the number of weeks worked in the previous year. The figures shown for the percentages of all female workers working thirty-five hours per week or more are calculated from the *1951 Census of Canada*, Volume V, Table 8; the *1961 Census of Canada*, Volume III, Part 3, Table 21; and the *1971 Census of Canada*, Volume III, Part 7, Table 32. The 1951 data are based on wage and salary earners 14 years of age and older who reported the number of hours worked in the week prior to enumeration. The data for 1961 and 1971 are based on wage and salary earners 15 years of age and older who reported the usual number of hours worked per week for the job held in the week prior to enumeration, or otherwise for the job of longest duration held since January 1 of the previous calendar year.

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TABLE 6—ONE SET OF ESTIMATES FOR σ, β_5, AND β_4

	Age Groups							
	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59
σ	.720	1.217	1.177	1.059	.770	1.028	.974	1.010
β_5	.0030	.0044	.0015	.0027	.0011	.0013	.0007	.0024
β_4	1.709	2.718	1.304	1.627	1.434	.838	.724	.628

those who do participate (or do work in our study). We agree with Hall that for many purposes estimates of the overall labor supply function are required. We do not agree, however, that it is thus desirable to directly estimate the overall supply function.

From equations (10) and (12) in our model we see that the coefficient of the *log* of the offered wage in our function for the probability that a wife will work is $1/\sigma$, while the coefficient of this wage variable in our hours of work equation is $(1/\beta_5)(1-\beta_4)$. One set of indirect estimates for the parameters σ, β_5, and β_4 are shown in Table 6. The estimates of σ were obtained from the probit and offered wage coefficients of the education variable, while the estimates of β_5 were calculated using our estimated values for σ and the probit and hours equation coefficients for the employment income of the husband.[13] The resulting estimates for σ and β_5 are always positive, as required by our model. Moreover, despite the sign change from negative to positive between the age groups 40–44 and 45–49 for the estimated coefficients of *ln w* in our hours equations, our estimates for β_4 are always positive as hypothesized. Undue attention to the exact parametric specification of our model is unwarranted. However, the point is that if the coefficients of the wage rate variable in the function for the probability of working (or participating) and in the conditional labor supply function are not the same, then the direct estimation of an overall labor supply function will obscure the underlying behavioral responses to a change in the wage rate of the probability of working and the hours of work for those who do work.[14]

This point can best be made, perhaps, by jumping ahead to one of our examples given in Section VII. For a particular wife, we find that an exogenously induced increase in her estimated offered wage from \$2.34 per hour to \$3.28 increases her probability of working from 30.5 to 39.4 percent, but decreases her expected annual hours of work if she does work from 2,051 to 1,855 hours. However,

[13]To obtain the estimates of σ shown in Table 6, for each age group we divided our estimate shown in Table 4 of the appropriate element of the vector α_1 in equation (13) by our estimate shown in Table 3 of the appropriate element of the vector α_1/σ. Then to obtain the estimates of β_5 shown in Table 6, for each age group we divided our estimate shown in Table 3 of $-\beta_3/\sigma$ in equation (12) by our estimate shown in Table 5 of $-\beta_3/\beta_5$ in equation (14) and then multiplied by the appropriate estimate of σ from Table 6. Finally to obtain the estimates of β_4 shown in Table 6, for each age group we multiplied our estimate shown in Table 5 of $(1-\beta_4/\beta_5)$ in equation (14) by the negative of the appropriate estimate of β_5 shown in Table 6 and added 1. The education and the employment income of the husband variables were used in estimating σ and β_5 because of the generally small standard errors and consistent behavior of the coefficients for these variables over age groups. It should be noted, however, that the coefficients of any variable appearing in both equations (12) and (13) could be used to obtain an estimate of σ, and any one of these estimates of σ could be used together with the coefficients of any variable appearing in both equations (12) and (14) to obtain an estimate of β_5.

[14]Most studies in which the overall labor supply function of wives is "directly" estimated, to use Hall's terminology, in fact involve a two-stage estimation procedure. First wage rates are imputed to wives who did not work, or to all wives in the sample, based on the observed wage rates of those wives with similar characteristics who did work. Then an hours of work equation is estimated for all wives in the sample, including those who worked zero hours (see, for instance, Hall and Rosen). The labor supply function estimated is thus conditional on the imputed, or imputed and observed, wage rates. Labor supply functions estimated in this manner are "overall," however, in the sense that they apply to all wives, not just those choosing to work. It should be noted too that the statistical problem which Hall cited as the major drawback of the estimation of a labor supply function conditional on the decision to work has been overcome in this paper, theoretically at least, by the introduction of a selection bias term as suggested by Heckman (1976).

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simple calculation reveals that the *unconditional* expected number of hours of work for the wife in this example rises from 626 to 731 hours.

A second difference between our study and those of most other researchers lies in the choice of variables used to control for child status. In our own study we have included variables for the number of children younger than 6, the number of children 6–14 years of age, the product of the numbers of children in these two age groups, and the number of children ever born. On the other hand, Hall (1973) includes separate dummy variables for the presence of children younger than 7 only, the presence of children 7–13 only, and the presence of children in both age groups. And Heckman (1974, 1976, 1977) and Harvey Rosen only control for the number of children younger than 6. Moreover while we have analyzed the behavior of wives in five-year age groupings, Hall's study includes in the same analysis wives aged 20–59 and the studies by Heckman and Harvey Rosen include wives aged 30–44.

For our sample of working wives we find that the percentage who have children younger than 6 falls from 46.4 percent for wives 30–34 years of age, to 27.5 percent for wives 35–39 years old, to 12.1 percent for those aged 40–44. Moreover, of those working wives in these age groups who have children younger than 6, we find that 65.3, 81.1, and 79.4 percent, respectively, also have children 6–14 years of age. Yet neither Heckman nor Rosen differentiate between, say, a wife with one child younger than 6 and another wife with one child younger than 6 and three more children ranging from 6 to 16. Hall, on the other hand, fails to differentiate between wives with different numbers of children in the same age groups, and between older wives who have never had any children versus those whose children are all 14 years of age or older.

In Table 7 the working wives in our sample have been cross classified by their estimated offered wage rates and various measures of child status. For each cell containing thirty or more observations we show the mean annual number of hours worked and the mean number of children ever born.

When these wives are classified by their expected wage rates and the number of children younger than 6, as shown in columns 10 through 13 of Table 7, we find that there is a tendancy for wives 20–24 and 25–29 years of age who have higher estimated wage rates to work fewer, rather than more, hours. This tendancy is positive, however, for all of the older age groups. It should be noted moreover that after categorization of these wives by the number of children younger than 6 a strong negative association remains between the estimated wage rate and the number of children ever born, even for those wives in the two youngest age groups.[15] Nor is it intuitively surprising that wives with fewer children ever born also tend to have higher average numbers of hours worked than wives with more children ever born.

In columns 6 through 9 of Table 7, these same wives are cross classified by their estimated wage rates and their child status groups defined as 1) no children younger than 14, 2) children younger than 6 only, 3) children 6–14 only, and 4) children both younger than 6 and 6–14 years of age. Again we find a strong residual tendancy for wives with higher expected wage rates to have fewer children ever born. Thus our concurrent finding for this classification scheme that wives with higher estimated wage rates often work more hours than wives with lower estimated wage rates is, perhaps, to be expected.

Looking finally at the first five columns of Table 7, where these same working wives have been categorized by their estimated wage rates and their numbers of children ever born, we now find that wives younger than 45 with higher estimated wage rates tend systematically to work fewer hours. From Table 5 we see that these are the same five younger age groups for which the regression coeffi-

[15]In the exploratory phases of our analysis children ever born was used as an explanatory variable in our regression equations explaining the *log* of the offered wage rate. We replace this variable by the number of children younger than 6 because it was generally found to be insignificant in these regressions. Thus, the strong negative relationship between the estimated wage rate and the number of children ever born is believed to be due to the common influence of some third variable such as education.

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TABLE 7—MEAN HOURS WORKED AND CHILDREN EVER BORN FOR WORKING WIVES CLASSIFIED BY THEIR ESTIMATED WAGE RATES AND VARIOUS MEASURES OF CHILD STATUS

Estimated Wage Rate	Number of Children Ever Born: 0	1	2	3	4+	Child Status Group: None <14	<6 Only	6–14 Only	<6 and 6–14	Number of Children <6: 0	1	2	3+
20–24													
<$2.50	1576[a]	1125	920	810		1583	1060		840	1578	1099	920	
	0.0[b]	1.0	2.0	3.0		0.0	1.2		2.1	0.1	1.0	2.0	
	(1353)[c]	(800)	(253)	(49)		(1356)	(1046)		(41)	(1376)	(852)	(210)	
≥$2.50	1446					1445				1445			
	0.0					0.0				0.0			
	(370)					(373)				(373)			
25–29													
<$2.50	1587[d]	1214	956	952	843	1681	994	1276	888	1500	1061	788	775
	0.0	1.0	2.0	3.0	4.6	0.2	1.5	2.1	2.7	1.0	1.7	2.4	3.6
	(232)	(283)	(437)	(185)	(81)	(219)	(467)	(177)	(355)	(396)	(486)	(288)	(48)
≥$2.50	1663	1115	881	841		1667	966	1455	989	1648	1044	764	
	0.0	1.0	2.0	3.0		0.0	1.2	1.4	2.3	0.2	1.2	2.1	
	(722)	(446)	(223)	(36)		(724)	(543)	(72)	(94)	(796)	(478)	(154)	
30–34													
<$2.50	1574	1311	1134	1068	1048	1543	1013	1250	967	1304	975	969	
	0.0	1.0	2.0	3.0	4.7	0.3	1.4	2.5	3.4	2.1	2.7	3.7	
	(125)	(159)	(360)	(282)	(238)	(129)	(104)	(563)	(368)	(692)	(360)	(98)	
≥$2.50	1615	1203	997	947	863	1640	977	1313	870	1464	1008	704	
	0.0	1.0	2.0	3.0	4.4	0.0	1.4	2.0	2.7	1.1	1.9	2.4	
	(158)	(177)	(223)	(134)	(43)	(150)	(203)	(175)	(207)	(325)	(293)	(102)	
35–39													
<$2.50	1569	1320	1159	1156	1013	1540	814	1197	928	1258	948	684	
	0.0	1.0	2.0	3.0	5.1	0.9	1.7	3.1	4.1	2.7	3.6	4.2	
	(106)	(119)	(329)	(308)	(409)	(161)	(52)	(754)	(304)	(915)	(291)	(54)	
≥$2.50	1389	1310	1133	989	1160	1538	892	1180	913	1271	915	916	
	0.0	1.0	2.0	3.0	4.6	0.4	1.3	2.7	3.3	2.1	2.5	3.0	
	(83)	(73)	(124)	(110)	(94)	(91)	(39)	(267)	(87)	(358)	(90)	(33)	
40–44													
<$2.50	1500	1395	1288	1243	1125	1502	1074	1169	991	1294	985		
	0.0	1.0	2.0	3.0	5.1	1.7	2.8	3.4	4.7	2.8	4.2		
	(149)	(164)	(350)	(306)	(518)	(481)	(41)	(805)	(160)	(1286)	(169)		
≥$2.50	1425	1304	1128	1004	1159	1400		1069	1137	1167	1078		
	0.0	1.0	2.0	3.0	4.7	1.6		3.1	4.0	2.6	3.5		
	(42)	(43)	(102)	(101)	(121)	(107)		(255)	(37)	(362)	(45)		
45–49													
<$2.50	1464	1452	1313	1354	1261	1421		1255	960	1358	909		
	0.0	1.0	2.0	3.0	5.2	2.1		3.9	5.4	2.8	4.8		
	(139)	(155)	(327)	(266)	(410)	(768)		(465)	(46)	(1233)	(59)		
≥$2.50	1486	1486	1238	1313	1093	1401		1126		1291			
	0.0	1.0	2.0	3.0	4.9	1.7		3.5		2.4			
	(97)	(71)	(165)	(124)	(146)	(360)		(239)		(599)			
50–54													
<$2.50	1484	1302	1296	1243	1232	1324		1188		1295			
	0.0	1.0	2.0	3.0	5.3	2.4		4.2		2.7			
	(138)	(139)	(270)	(198)	(306)	(816)		(219)		(1035)			
≥$2.50	1716	1681	1300	1153	1264	1475		1186		1403			
	0.0	1.0	2.0	3.0	5.0	1.9		4.0		2.4			
	(55)	(46)	(71)	(49)	(80)	(225)		(74)		(299)			
55–59													
<$2.50	1467	1263	1262	1186	1259	1274		1234		1272			
	0.0	1.0	2.0	3.0	5.4	2.7		5.0		2.9			
	(83)	(91)	(166)	(129)	(212)	(635)		(46)		(681)			
≥$2.50	1387	1390	1357	1344	1253	1363				1350			
	0.0	1.0	2.0	3.0	4.6	1.9				2.0			
	(61)	(48)	(79)	(51)	(45)	(271)				(284)			

[a]Mean annual number of hours worked.
[b]Mean number of children ever born.
[c]Number of observations.
[d]Underlining is used to denote categories where the mean number of hours worked is found to increase with increases in the estimated wage rate.

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cients of our wage rate variable were found to be significantly negative. Table 7 also reveals that the exceptions to this pattern for wives younger than 45 all occur in the child status categories of 0 and 4+ children ever born. These two categories deserve further comment.

In the category for 4+ children ever born, there is still a persistent tendancy for wives with higher estimated wage rates to have smaller mean numbers of children ever born than wives with lower estimated wage rates. Thus again the finding that wives in this child status category tend to work more hours if their estimated wage rates are higher is not surprising.

In the case of wives with no children ever born, the problem is different. Looking at the row in Table 7 for wives 25–29 who earn less than \$2.50, we find there are 396 wives with no children younger than 6, 219 wives with no children younger than 14, and 232 wives with no children ever born. The number of children ever born to a women includes all live births, even if the children born have since died, but excludes children who were born to other women but who are living with the wife in question. Thus we find that of the 232 zero parity wives referred to above, 199 have no children younger than 14 living with them, but 25 have children younger than 6 living with them, 5 have children aged 6–14 living with them, and 3 have both children younger than 6 and children aged 6–14 living with them. Moreover the corresponding mean numbers of hours of work for these different categories of zero parity wives are 1,651, 1,166, 1,341, and 1,224. This example underlines the extreme difficulty of adequately controlling for child status by the use of any single variable.

One further distinguishing feature of our study is that we have not included education in our asking wage equation, and hence it does not appear as a separate variable in our hours equation. This variable was dropped from our asking wage equation largely because the inclusion of both this variable and the estimated offered wage in our hours equation resulted in severe problems of multicollinearity.

Whatever the biases may be in our estimates of the impact of the offered wage on hours of work, it is interesting to note that the associated wage elasticities evaluated at the mean hours of work for the age groups 20–24 through 55–59 are −.194, −.313, −.173, −.199, −.320, .094, .299, and .120, respectively. While all of our estimates are well below the range of positive elasticities reported by other researchers for married women, they seem broadly consistent with Orley Ashenfelter and Heckman's estimate of −.15, Sherwin Rosen's estimates of −.30 to −.07, Finegan's estimates of −.35 to −.25, and John Owen's estimates of −.24 to −.11, where all of these estimates are for men.

VI. Explanatory Power of the Estimated Model

Looking at the pseudo R^2s and the R^2s shown in Tables 3–5, our estimated equations seem to explain very little about the labor force behavior of individual married women. This is to be expected since we do not have data on many of the factors which have important effects on the lifetime career patterns of individual women. However, the variables included in our estimated relationships should capture some of the *average* or macro differences between groups of wives.

To check the extent to which this is true, we first used the relationships shown in Table 3 to predict whether or not each married woman in our data sample worked in 1970. We then grouped these women according to age (15–24, 25–34, 35–44, 45–64, 65+), education (< 12 years, complete high school, bachelor or first professional degree), presence of children in different age groups (none < 14, < 6 only, 6–14 only, < 6 and 6–14), earned income of husband plus family asset income (< \$3,000, \$3,000–\$5,999, \$6,000–\$8,999, \$9,000–\$11,999, \$12,000–\$14,999, \$15,000+), place of residence (urban, rural), and region (Maritimes, Quebec, Ontario, Prairies, British Columbia). For each of the resulting 3,600 groups we computed the proportion of wives predicted to work and the proportion who actually worked, and regressed the predicted on the actual proportions of working wives using *GLS*

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because the 3,600 groups do not all contain the same number of observations. The combined grouped R^2 calculated in this manner is .9072. Likewise we used the relationships shown in Table 4 to calculate an offered wage for each of the wives in our data sample who worked in 1970, and computed the mean actual and estimated wage rates for the wives in each of our 2,880 groups. (The age categories are now 20–24, 25–34, 35–44, and 45–59.) The R^2 for the *GLS* regression of the estimated on the actual mean wage is .7307. Using the estimated wage rates already calculated and the relationships shown in Table 5, we now calculated a combined grouped R^2 of .9591 for the annual number of hours worked, and a combined grouped R^2 of .6254 for the estimated annual income.

VII. Policy Conclusions

Our estimation results indicate that variables under the control of individual wives, or these wives and their families, do have substantial impacts on the labor force behavior and earned incomes of these wives. It is difficult, however, to jump from the presentation of empirical results in the preceding sections to a discussion of the implications of these results for public policy. In the first place, large-scale government programs would have substantial secondary impacts through changes in the macro economy which cannot be explored using a model which treats macro phenoemena as exogenous. Secondly the causal significance of our findings is often unclear. For instance, are large numbers of women with small children not working because of the associated "costs" of working as we have postulated, or are they not working because of tastes and preferences which lead them to have both high asking wages and the desire to care for their own children. Government programs also entail costs, and no cost information is presented in this paper. Moreover the impacts of a government program would not generally be limited simply to changes in the propensity to work, wage rates, hours of work, and incomes. Concepts like self-fulfillment, role models, the right of women to have control over their own bodies, equal pay for equal work, and so forth really lie outside the scope of this analysis. However, with these qualifications firmly in mind, certain tentative observations can still be made.

We will make these observations in the context of a numerical example. Consider an average 41-year-old wife living in a small New Brunswick city with three children aged 16, 13, and 4, and a husband whose earned income is \$8,400. Assume that the asset income of the family is \$373 per year, the wife was 21 years old when she got married, and she completed nine years of formal education. Our estimated relationships predict that this wife has a 30.5 percent probability of working, and that if she does work she will earn \$2.34 per hour, work 2,051 hours per year, and have an annual income of \$4,810.

Suppose now that this wife had stayed in school three more years, or had completed three more years of schooling in a continuing education program for adults. Our equations predict that with a grade 12 rather than a grade 9 education she would have a probability of working of 37.1 percent, an hourly wage of \$3.01, a work year of 1,902 hours, and an annual income of \$5,735. Or suppose that the birth of the third child had been prevented through improved usage of contraceptives, a vasectomy or tubal ligation, or an abortion. Now the wife's expected probability of working would be 43.2 percent, her expected hourly wage rate would be \$2.83, her expected work year would be 2,150 hours, and her expected annual income would be \$6,087. Alternatively, suppose that this family moved to a city with a population over 30 thousand in Ontario, with the husband's income remaining unchanged. The 1970 unemployment rate for Ontario is 4.3 percent compared with 8.0 percent for New Brunswick. Also the 1970 value of our local opportunity for jobs index for large cities in Ontario is .49 compared with .39 for New Brunswick. In this more favorable labor market the wife's expected probability of working, wage rate, work year, and annual income are 42.9 percent, \$2.83, 1,889 hours, and \$5,346, respectively.

For wives who cannot move, of course,

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local labor market conditions are givens which can only be altered through direct government spending, legislation, court rulings, or economic growth. Suppose the coefficients of the variable for the number of children younger than 6 in the asking wage function were reduced in size by 20 percent through government subsidies to day care, tax credits for child care expenses, or reduced regulation of private day care. Now our New Brunswick wife would be expected to have a 33.4 percent probability of working, a wage rate of $2.47, a work year of 2,077 hours, and an annual income if she works of $5,129. Or suppose that the constant term in our function for the *log* of the offered wage were exogenously increased by .1823 through equal pay legislation, raising the mean wage for wives aged 40–44 fairly close to the mean wage for men in this age group. Now we would expect this same wife to have a probability of 39.4 percent of working, a wage rate of $3.28, a work year of 1,855 hours, and an annual income of $6,079.[16] Another legislative or judicial happenstance might be quotas for women by occupation. To take an extreme example, suppose it were required that 50 percent of the jobs in all occupations be held by women, and that this could be accomplished without any change in the unemployment rate or the total number of workers in each occupation. Then the value of our opportunity for jobs index would rise from .39 to .54. If the employment income of her husband and the family asset income remained unchanged as well, we would now expect our New Brunswick wife to have a probability of 42.1 percent of working, a wage rate of $2.97, a work year of 1,875 hours, and an annual income of $5,574.

Economic growth has been largely ignored as a factor affecting the labor force behavior and earned incomes of women. Our results indicate, however, that if the total number of jobs available in small New Brunswick cities in the Clerical, Sales, and Service occupations were for instance doubled, the value of the local opportunity for jobs index would rise from .39 to .60. As a result we would expect our 41-year-old wife to have a probability of working of 47.2 percent, a wage rate of $3.27, a work year of only 1,805 hours, and an annual income of $5,900. Thus substantial improvement in both the probability of working and the accompanying monetary rewards can be obtained within the existing structure of occupational segregation through economic growth. Not all types of growth will produce these results, however. If this same unrealistically large number of new jobs were created in Construction rather than the Clerical, Sales, and Services occupations, the value of our local opportunity for jobs index would still be .39 to two significant places, and the expected labor force behavior and potential annual income of our New Brunswick wife would remain virtually unchanged.

Finally, economic conditions beyond the control of a wife or her family may also affect her labor force behavior through their impact on the earned income of her husband. Suppose that the husband of our hypothetical wife earned only $6,400 instead of $8,400. Now we would expect this wife to have an increased probability of working of 32.6 percent, a wage rate of $2.44, an increased work year of 2,094 hours, and an annual income of $5,110.

The impacts of these various exogenous changes on the expected wage rate, labor supply, and earned income of our hypothetical New Brunswick wife are summarized in Table 8. One obvious observation to be made from the figures presented in Table 8 is that all of the changes considered, except an increase in construction jobs, do increase the probability of working for wives like the one in our example. These same changes also all lead to increases in the unconditional expected labor supply of these wives, which is the product of the estimated probability of working and the expected annual hours of work given the decision to work. The welfare, or utility, implications for these wives of these various changes may be quite different, however. For instance, few wives would see a fall in their husband's income as improving their welfare. In fact, government programs designed to improve the job prospects and wage rates of low-income men may well be the first choice of wives working relatively

[16]The appropriate estimate of σ shown in Table 6 was required to compute these estimates.

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TABLE 8—EXPECTED IMPACTS OF VARIOUS EXOGENOUS CHANGES ON THE WAGE RATE AND LABOR SUPPLY OF A HYPOTHETICAL WIFE[a]

Changes[b]	Expected Probability of Working (percent)	Expected Offered Wage (dollars)	Conditional Expected Annual Hours of Work	Conditional Expected Income of Wife (dollars)	Unconditional Expected Annual Hours of Work
Control	30.5	2.34	2,051	4,810	626
Three more years of education	37.1	3.01	1,902	5,735	706
Birth of third child prevented	43.2	2.83	2,150	6,087	929
Moved to large city in Ontario	42.9	2.83	1,889	5,346	810
Subsidized day care for third child	33.4	2.47	2,077	5,129	694
Drastic equal pay legislation	39.4	3.28	1,855	6,079	731
Drastic occupational quotas for women	42.1	2.97	1,875	5,574	789
Drastic increase in clerical, sales and service jobs	47.2	3.27	1,805	5,900	852
Drastic increase in construction jobs	30.5	2.34	2,051	4,810	626
Husband's income reduced to $6,400	32.6	2.44	2,094	5,110	683

[a]This wife is 41-years old, has nine years of education, married at age 21, has a husband who earns $8,400, and lives in a small city in New Brunswick in a family with three children aged 4, 13, and 16, and $373 of asset income.
[b]See text for details.

long hours to compensate for the low incomes of their husbands.

Child care and birth control programs primarily benefit those wives who take advantage of the child care subsidies or who would otherwise have unwanted pregnancies. Older wives; infertile wives; and wives who prefer informal to paid child care, or who already have access to all the medical help they want in controlling their own fertility, will not be affected by these programs. Moreover the welfare of the individual wives using these services might well be higher if the money spent on these programs were instead distributed among them as aid payments which could be spent according to the needs of each family. The justification for public funding of programs of this type must lie then in the efficiency gains or in the personal and social externalities associated with the public provisions of certain tied benefits and services.

The remaining types of changes for which figures are shown in Table 8 all serve to raise the offered wage, and would presumably benefit wives of all ages and child statuses. The resulting increases in earning power could be spent as desired by each family. Moreover, measures which raise the offered wage, as opposed to lowering the asking wage, allow wives the choice of increasing or maintaining their levels of earnings while spending more time with their families or on other nonmarket activities.

Strictly on the grounds of individual welfare, therefore, it would appear that government policies designed to raise the offered wage rates of women are to be preferred to programs such as subsidized child care which primarily affect the asking wage. Within these two categories of measures there are also differences in the magnitudes of the expected labor force responses. The prevention of the birth of an unwanted child, for instance, would appear to result in a higher level of economic well-being for the family involved than the subsequent subsidization of care for this child following its birth. For desired children, of course, this tradeoff does not exist.

Likewise the above figures suggest that for many individual wives it would require the imposition of drastic equal pay legislation or job quotas, or massive creation of jobs in female-dominated occupations, to yield the same increase in offered wage rates as a few more years of education. This suggests that a higher priority should be given to the provision of free continuing adult education, and the availability of scholarships and loans for women who wish to attend postsecondary

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educational programs either immediately following graduation from high school or later in their lives. Many wives might like to return to school after their youngest child has entered primary school, for instance. Of course, if large numbers of women obtained additional education this would eventually serve to depress the returns to this education.

One final observation is that stimulation of female-dominated industries or occupations may have many of the same desirable effects on the employment prospects for women that more equal pay legislation or job quotas by sex would have, without the uncomfortable accompaniments of interfering through the legislative and judicial systems in individual hiring decisions and negotiations. In this respect, the economic development of the last few decades has been a strong supporter, or perhaps even an instigator, of the women's movement.

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