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An econometric analysis of the “backward-bending” labour supply of Canadian women

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Abstract

This econometric study investigates the labour supply behaviour of Canadian women at different composite hourly wages of all paid jobs. The objectives of this study are to test the canonical model of labour supply and to observe women's responsiveness to changes in the wage rate by using 2009 cross-sectional data. The results show a backward bending labour supply schedule for Canadian women, and thereby confirm the conclusions reached by the Nakamuras (1981), and Robinson and Thomes (1985).

Keywords

: Canada, Women, Backward-bending, Labour supply function, Heckit method

Cover Page Footnote

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I. Introduction

The focus on the female supply side in Canada is motivated by two major issues. In 2006, Canada's population consisted of 49% males (15.5 million) and 51% females (16.1 million), a sex ratio of 96 males per hundred females. Females outnumbered males in every province except for Alberta and the three territories [*The Atlas of Canada*]. However, the labour force participation rates are generally higher among men than women in Canada. In 2006, the participation rate for Canadian men was 72.5% and 62.1% for Canadian women [*CCSD Facts & Stats*].

The other issue is that of gender discrimination affecting Canadian women. Because of gender discrimination, women who perform the same tasks as men are often paid less and receive fewer benefits from their work. Even in developed countries like Canada, women earn only 70.4% of what men earn – a percentage lower today than in the 1990's [*Gender Discrimination in Canada*]. By understanding the female participation behaviour, policy makers will be in a position to assess the likelihood of tackling this issue, and provide effective policy prescriptions.

The analysis in this paper focuses on Canadian women in ten provinces with ages between 24 and 60. The objective of this paper is to test the assumption that the canonical model of labour supply is backward-bending for Canadian women. The second objective is to test if factors that determine labour supply decisions differ according to the economic well-being of the household where the female worker lives. However, this paper does not provide any policy prescriptions regarding the nature of labour supply for Canadian women and leaves the implications of the findings to the decision makers in charge.

According to Robinson and Tomes (1985), given that men typically work more hours and receive higher wages than women do, the larger income effect was expected to dominate the substitution effect for men, resulting in a backward-bending labour supply curve. On the other hand, for women the dominant substitution effect generates a positively sloped labour supply curve consistent with the upward trend in female labour force participation. In the United States, studies by Hall (1973) and Boskin (1973) provide empirical support for these arguments. In addition, the results for Canada reported by Carliner et al. (1980)[1] for Canadian women are also congruent with this old view.

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[1] Carliner et al. (1980) in their analysis of 1971 Canadian census data employ three measures of labour supply: labour force participation, hours per week, and weeks per year. Using education as a proxy for potential market wages they found that "greater education of the wife is associated with significantly increased labour supply for all three measures. This suggests that the … substitution effects of an increase in w_f [the wife's wage] … outweigh the income effect".

However, this old view has been initially contested in a series of influential papers by Alice and Masao Nakamura[2] [Nakamura, Nakamura, and Cullen, (1979); Nakamura and Nakamura, (1981), (1983)], and later by Robinson and Tomes (1985) who corroborated the Nakamuras' findings with better dataset. Their results showed that the estimated labour supply elasticities are predominantly negative, implying a backward-bending supply curve, and are broadly consistent with values typically reported for men. Hence the results of the Nakamuras and Robinson and Tomes suggest that there is no significant disparity between the labour supply elasticities of working men and women.

The results of the Nakamuras were of controversial nature at the time, and Nakamuras' hypothesis was subject to independent tests especially by Robinson and Tomes (1985) and others. According to Robinson and Tomes (1985), past studies used census data that suffer from several drawbacks. They described that the first problem was that the actual hours of work were not recorded and instead intervals were used. The use of intervals is particularly problematic for females, because more females tend to supply hours outside the "normal" range and hence fall in much wider intervals than the males. The second problem was that an actual wage was not recorded. The wage has to be computed by dividing observed annual earnings by computed annual hours which results in a problem of division bias [Borjas (1980)]. Similar to the study of Robinson and Tomes (1985), this study deals with these problems but in a different manner[3]. By using cross-sectional data of the Survey of Labour and Income Dynamics (SLID) from Statistics Canada, a direct measure of the hourly wage rate and the direct hours of work for a subset of women in Canada were obtained.

The remainder of the paper is organized as follows: Section 2 is a theoretical background on the labour supply model; Section 3 lays out the econometric model and estimation method; Section 4 covers the data and variables of concern; Section 5 discusses the empirical findings; Lastly, Section 6 provides summary and concluding remarks.

[2] The emphasis of the three papers is quite different. Nakamura, Nakamura, and Cullen (1979) report estimates for Canadian women using the 1971 Canadian census. Nakamura and Nakamura (1981) analyze both Canadian and U.S. census data emphasizing the role of taxes. Nakamura and Nakamura (1983) using these same data sets, distinguish further between full-time and part-time workers.

[3] Robinson and Tomes (1985) used data from 1979 Quality of Life Survey, which is a survey conducted by the Institute for Behavioural Research, York University, to deal against the problems of using census data for their study. The survey contained a direct measure of the hourly wage rate and also presented hours of work directly rather than in intervals for a subset of Canadian women.

II. Theoretical Background

Nowadays, the fact that the average industrial worker worked almost 60 hours per week, the equivalent of six 10-hour days in the early 20th century [Benjamin et al. (2007)] is a distant memory. But it was not until the 1960s that the average hours of labour in manufacturing changed to the more familiar "40-hour" work week, and have been on the decline ever since [Benjamin et al. (2007)]. Table 1.1 below traces the standard work week in Canadian manufacturing and shows a visible and continuous decline over time in hours of labour. Between 1901 and 1981 the standard work week declined from 58.6 hours to 39.2 hours with a mean of approximately 47 hours. The decline slowed down in the depression years of the 1930s, and the war years of the 1940s, and it seems to be slower in the postwar period. However, as the last column illustrates, when vacations are considered the decline in average working hours is more noticeable. In essence, in recent years the work force has reduced its working hours more in the form of increased vacations and leisure activities rather than a reduction in hours worked per week. The decline in net weekly hours in the postwar period and in standard hours prior to World War II give a long-run trend reduction of about two hours per decade.

Table 1.1: Standard Weekly Hours in Manufacturing, Canada, 1901-1981[4]

Year	Standard Weekly Hours[5]	Hours Net of Vacation[6]
1901	58.6	N/A
1911	56.5	N/A
1921	50.3	N/A
1931	49.6	N/A
1941	49.0	N/A
1951	42.6	40.7
1961	40.4	38.1
1971	39.8	36.7
1981	39.2	34.8

Benjamin et al. (2007) reaches the conclusion that due to the rise in real wages over the century, this long-run decline in hours worked is inconsistent with

[4] Source: See http://highered.mcgraw-hill.com/sites/dl/free/0070891540/43156/benjamin5_sample_chap02.pdf for the original table.
[5] Standard hours are usually determined by collective agreements or company policies, and they are the hours beyond which overtime rates are paid. The data apply to non-office worker.
[6] Standard hours minus the average hours per week spent on holidays and vacations.

an upward-sloping labour supply function. They suggest an alternative effect of increased wages on hours, i.e., “as people become wealthier, they need not toil as hard, and can afford to take more time off.” [Benjamin et al. (2007)]. This view is explained by the classical theory of labour.

The classical theory of labour supply states that at low levels of income the substitution effect dominates which results in a positive elasticity of labour supply (raising wages raises hours of work). On the other hand, at high wage levels, the income effect dominates resulting in a negative elasticity (raising wages reduces hours of work). In other words, the income effect of higher wages means workers will reduce the amount of hours they work, because they can maintain a target level of income through less work. On the other hand, the substitution effect of higher wages means workers will give up leisure to do more hours of work because more work leads to higher rewards. As a result, the labor supply schedule forms a backward-bending shape for an individual [Robins (1930)]. Since Canada is a developed country, this type of a backward-bending labour supply schedule for the majority of Canadians is to be expected.

1. *The backward-bending labour supply model*:

The individual labour supply curve, relating desired hours of work to the wage rate can be derived by tracing out the labour supply choices (tangencies) in response to different wages. Labour supply is zero until the wage equals the reservation wage. For higher wages, the slope of the labour supply function depends on the relative magnitudes of the income and substitution effects (Figure 1.2)[7].

Figure 1.2 suggests that if real wages were to increase from W1 to W2 then the worker will obtain a greater utility, due to their higher income. Therefore, he/she would be willing to increase their hours worked from L1 to L2. Note that this may be hours worked per day, month, year or even lifetime. Over this section of the curve the substitution effect is positive while the income effect is negative. The substitution effect is greater than the income effect giving rise to a positive price effect. Therefore, the increase in the real wage rate will cause an increase in the number of hours worked.

However, if the real wage increased from W2 to W3, then the number of hours worked would fall from L2 to L3. This is because the income effect has now become greater than the substitution effect. In addition, the utility gained

[7] This supply curve shows how the change in real wage rate affects the amount of hours worked by employees. Source: http://en.wikipedia.org/wiki/Backward_bending_supply_curve_of_labour. See the appendix section.

from an extra hour of leisure is greater than the utility gained from the income earned working. Most importantly, beyond the wage of W2 we see that the worker is being paid enough to sustain their current lifestyle without having to work more hours, therefore creating the backwards bend in the curve.

III. Literature Review

According to El-Hamidi (2003), a vast number of studies on the labour supply of women in developed economies were carried out. However, these studies have produced a wide-range of conflicting estimates of labour supply elasticities with respect to wages and income. In their comprehensive survey of the literature, Killingsworth and Heckman (1986) concluded that estimates of women labour supply elasticities in these contexts are large, both in absolute terms and relative to male elasticities. The wage elasticity estimates vary widely from –0.85 to over 14, depending on the data source, the sub-populations studied (which vary by age group, marital status, and race) and the statistical methodology used. Killingsworth and Heckman (1986) list a wide range of positive estimates of wage elasticities while Nakamura, Nakamura, and Cullen (1979) obtained negative uncompensated wage elasticity. Killingsworth (1983) primarily attributes this result to excluding the schooling variable from the hours of work equation.

Another possible source of this result is the lack of a work experience variable in the wage equation, and/or the selection terms: Connelly, DeGraff and Levison (1997) compared the determinants of participation in employment with the determinants of hours worked for urban Brazilian women using 1985 household survey data. Because there are large proportions of households headed by unmarried women in Brazil, the authors divided their sample into single and married women heads of households. They found that the unobservable factors that increase the likelihood of employment of single women heads caused their hours of work to decrease, once employed. For women with spouses, unobservable factors worked in the same direction for both participation and hours worked.

The classical theory of labour supply states that a woman’s labour force participation decision is dependent upon a comparison of the market wage a woman can obtain and her reservation wage. The reservation wage is the lowest wage rate at which a worker would be willing to accept a particular type of job. It is related to the opportunity cost of a woman’s time at home (or in unpaid work), her unearned income, as well as other factors that may affect her preference for paid work, relative to other time uses. Thus, the labour supply function may be written as a function of the wage rate, other earnings and preferences. While an increase in the wage rate clearly increases the probability of labour force participation, the effect on the number of hours supplied is not as obvious, since both income and substitution effects come into play. The final decision depends on the marginal utility of consuming market goods and services purchased with wage income, relative to that derived from additional "leisure" time [El-Hamidi (2003)].

Killingsworth (1983) categorizes the empirical studies into first generation studies (FGS) and second generation studies (SGS). According to Killingsworth, FGS empirical studies were chiefly concerned with estimating the parameters of ad-hoc labour supply functions that were not derived from a formal model of utility maximization subject to constraints. Different aspects of labour supply (e.g. participation vs. hours of work) were dealt with in a piecemeal manner. On the other hand, SGS work is typically concerned with estimating the parameters of labour supply functions by maximizing an explicitly specified utility function subject to explicitly specified budget constraints.

In estimation, FGS generally assumed that the error term is randomly distributed and did not take into consideration the problem of selection into the workers' sample according to unobservable characteristics, which became an important issue in SGS. To ignore such problems of participation response may result in not only a loss of information about some aspects of labour supply but also in biased estimates of the parameters that govern labour supply. SGS attempts to deal with these problems by taking into account the fact that individuals are not randomly selected into the working sample, and that a large number of observations have exactly zero hours of labour supply [Killingsworth (1983)].

Long years of research on sample truncation by Cain and Watts (1973) and sample selectivity by Gronau (1974) and Lewis (1974), and Heckman (1974) show that employed workers are those who are offered higher market wages than their reservation wages. Hence, the sub-sample being used for the assessment of determination of wages and hours of work is a non-random sample of the population [El-Hamidi (2003)]. According to Vella (1998), selectivity bias is a result of the unobservable characteristics that is correlated in both wages and hours of work equations. To correct for selectivity bias in econometric models of labour supply, Heckman (1976)[8] suggested a two-stage estimation method. The two-stage estimation method is known as the Heckman correction or the Heckit

[8] Although the Heckman sample selection model is written in terms of hours of work H, the same equations
apply equally as well to the wage W.

method that involves a normality assumption and provides a test for sample selection bias and formula for the bias corrected model.

IV. The Econometric Model and Estimation Method

Consistent with existing literature [Heckman (1974)], let the desired hours in the cross-section of females be given by[9]:

(1) $h_i^* = \delta_0 + \delta_1 w_i + \delta_2 Z_i + \varepsilon_i$

where *Z* includes non-labour income and taste variables such as age and its square, education dummies, female is living with spouse, husband’s earnings, marital status, alimony dummy variable, and a dummy variable of the individual female living with a child less than six years old. One can think of ε_i as unobserved “tastes for work” (an unobserved, person-specific factor that makes female *i* work more or fewer hours than other observationally-identical females). We will refer to **(1)** as the *structural labour supply equation*. It represents the behavioural response of the individual female’s labour supply decision to her economic environment and our goal here is to estimate δ_1.

Suppose the market wage that female *i* can command is given by:

(2) $w_i = \beta_0 + \beta_1 X_i + \mu_i$

where *X* includes productivity and human capital variables such as age and its square, years of experience and it’s square, education and region dummies. In practice there may be considerable overlap between the variables in *X* and *Z*. It may be helpful to think of μ_i as “unobserved (wage-earning) ability” here. We will refer to **(2)** as the *structural wage equation*. The wage equation includes dummy variables that distinguish between different regions of residence. Since there is no theoretical reason justifying the inclusion of region dummies, they are excluded from the labour supply equation.

In the above situation we already know that OLS estimates of either **(1)** or **(2)** on the sample of female workers only will be biased (in the case of **(1)** because the sample includes only those females with positive hours; in the case of **(2)** because the sample includes only those females with wages above their reservation wage). So we formalize the nature and size of these biases, and obtain unbiased estimates of the δ’s and β’s as shown below.

We begin by substituting **(2)** into **(1)**, which yields:

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[9] All the steps of the Heckit method is borrowed from lecture notes: *Cross-Section Regression Estimates of Labour Supply Elasticities: Procedures and Problems*.

(3) $h_i^* = \delta_0 + \delta_1[\beta_0 + \beta_1 X_i + \mu_i] + \delta_2 Z_i + \varepsilon_i$
(4) $h_i^* = [\delta_0 + \delta_1\beta_0] + \delta_1\beta_1 X_i + \delta_2 Z_i + [\varepsilon_i + \delta_1\mu_i]$
(5) $h_i^* = \alpha_0 + \alpha_1 X_i + \alpha_2 Z_i + \eta_i$

where $\alpha_0 = \delta_0 + \delta_1\beta_0$; $\alpha_1 = \delta_1\beta_1$; $\alpha_2 = \delta_2$; $\eta_i = \varepsilon_i + \delta_1\mu_i$. We will refer to equation **(5)** as the *reduced form hours equation*.

As a final step in setting up the problem, note that given our assumptions female i will work a positive number of hours if and only if (iff):

(6) $h_i^* > 0$; i.e. $\eta_i > -\alpha_0 - \alpha_1 X_i - \alpha_2 Z_i$

Note that conditional on observables (X and Z) either high unobserved tastes for work (ε_i) or (provided $\delta_1 > 0$) high unobserved wage-earning ability (μ_i) tend to put all women into the sample of working women.

Next, to greatly simplify matters, we assume that the underlying error terms (ε_i and μ_i) follow a joint normal distribution. Note that (a) it therefore follows that the "composite" error term η_i is distributed as a joint normal with ε_i and μ_i; and (b) we have *not* assumed that ε_i and μ_i are independent. In fact, it seems plausible that work decisions and wages could have a common unobserved component. Indeed, one probably wouldn't have much confidence in an estimation strategy that required them to be independent.

Recalling that an observation is in the sample iff equation **(6)** is satisfied for that observation we get:

(7) $E(\varepsilon_i | h_i > 0) = E(\varepsilon_i | \eta_i > -\alpha_0 - \alpha_1 X_i - \alpha_2 Z_i)$
(8) $\equiv \theta_1 \lambda_i$

where in equation **(8)**, the first term, θ_1 is a parameter that does not vary across observations. It is the coefficient from a regression of η_i on ε_i; therefore of $\varepsilon_i + \delta_1\mu_i$ on ε_i. Unless δ_1 (the true labour supply elasticity) is zero or negative, or there is a strong negative correlation between underlying tastes for work, ε_i and wage-earning ability, μ_i, this will be positive. In words, conditioning on observables, women who are more likely to make it into the sample – i.e. have a high η_i – will on average have a higher residual in the labour supply equation, ε_i).

The second term in **(8)**, λ_i, has an i subscript and therefore varies across observations. Mathematically, it is the ratio of the normal density to one minus the normal cdf (both evaluated at the same point, which in turn depends on X and Z). This ratio is sometimes called the *inverse Mills ratio*. For the normal distribution, this ratio gives the *mean* property: If x is a standard normal variate, $E(x|x > a) = \varphi(a)/(1 - \Phi(a))$.

Now that we have an expression for the expectation of the error term in the structural labour supply equation **(1)** we can write:

(9) $\varepsilon_i = E(\varepsilon_i|h_i > 0) + \varepsilon_i^* = \theta_1\lambda_i$, where $E(\varepsilon_i^*) = 0$.

In a sample of participants, we can therefore write (1) as:

(10) $h_i^* = \delta_0 + \delta_1 w_i + \delta_2 Z_i + \theta_1\lambda_i + \varepsilon_i^*$

We call this the *augmented labour supply equation*. It demonstrates that we can decompose the error term in a selected sample into a part that potentially depends on the values of the regressors (*X* and *Z*) and a part that doesn't. It also tells us that, *if we had data on* λ_i and included it in the above regression, we could estimate **(1)** by OLS and not encounter any bias. Thus, one can think of *sample selection bias as a specific type of omitted variable bias* [Heckman (1979)].

Following the same reasoning for the market wage equation we get:

(11) $E(\mu_i|h_i > 0) = E(\mu_i| \eta_i > - \alpha_0 - \alpha_1 X_i - \alpha_2 Z_i)$

(12) $\equiv \theta_2\lambda_i$

Note that λ_i in **(12)** is exactly the same λ_i that appeared in **(8)**. The parameter θ_2 is the supply coefficient from a regression of η_i on ε_i; therefore of $\varepsilon_i + \delta_1\mu_i$ on μ_i. As before, unless δ_1 (the true labour supply elasticity) is zero or negative, or there is a strong negative correlation between ε_i and μ_i, this will be positive (on average, conditioning on observables, women who are more likely to make it into the sample – i.e. have a high η_i – will have a higher residual in the wage equation, μ_i).

Equation **(12)** allows us to write an *augmented wage equation*:

(13) $w_i = \beta_0 + \beta_1 X_i + \theta_2\lambda_i + \mu_i^*$, where $E(\mu_i^*) = 0$.

Thus, data on λ_i would allow us to eliminate the bias in wage equations fitted to the sample of working women only.

When (as we have assumed) all our error terms follow a joint normal distribution, the reduced form hours equation **(5)** defines a *probit equation* where the dependent variable is the dichotomous decision of whether to work or not (i.e. whether to be in the sample for which we can estimate our wage and hours equations). Note that all the variables in this probit (the *X*'s, *Z*'s and *whether* a female works) are observed for both female workers and female nonworkers. Thus we can estimate the parameters of this equation consistently. In particular (recalling that the variance term in a probit model is not identified) we can get consistent estimates of α_0/σ_η, α_1/σ_η and α_2/σ_η. Combined with the data on the *X*'s and Z's, these estimates allow us to calculate an estimated λ_i for each observation in our data.

Now that we have consistent estimates of λ_i, we can include them as regressors in a labour supply equation estimated on the sample of participants only. Once we do so, the expectation of the error term in that equation is identically zero, so it can be estimated consistently via OLS. We can do the same thing in the wage equation. This procedure is known as the *Heckit method*. When we implement this, we will as a matter of fact get estimates of the θ parameters (θ_1 in the case where the second stage is an hours equation; θ_2 in the case where the first stage is a wage equation). These in turn provide some information about the covariance between the underlying error terms ε_i and μ_i.

In general, this technique is used whenever we are running a regression on a sample where there is a *possible* (or likely) correlation between the realization of the dependent variable and the likelihood of being in the sample. In principle, one can correct for sample selection bias by (i) estimating a *reduced-form probit* in a larger data set where the dependent variable is included in the subsample of interest; then (ii) estimating the regression in the selected sample with an extra regressor, λ_i. According to the reasoning above, including this extra regressor should eliminate any inconsistency due to nonrandom selection in our sample.

V. Data and variables of concern

The cross-sectional data from Survey of Labour and Income Dynamics (SLID) Record Layout, 2009 is used for the empirical analysis. The survey includes extensive data concerning demographics, employment, unemployment, occupational history, migration, education, earnings, and parental background of all individuals in Canada, excluding residents of the Yukon, the Northwest Territories and Nunavut, residents of institutions and persons living on Indian reserves. Overall, these exclusions amount to less than 3 percent of the population[10] [*SLID*].

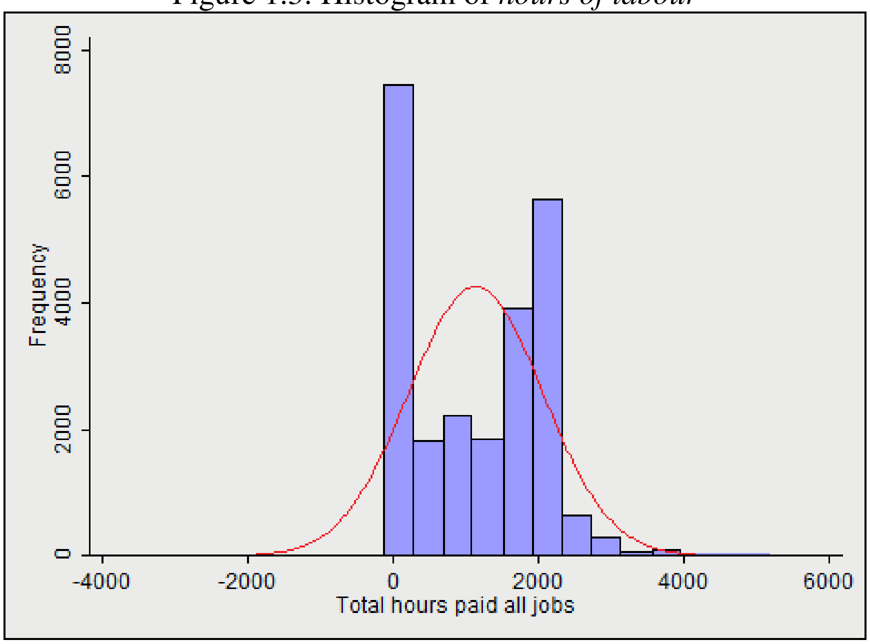
For the purpose of this study, two datasets from the 2009 SLID data: the external cross-sectional person dataset (ecp2009pr) and the external cross-sectional economic family dataset (ec2009ef) were merged together in Stata format[11]. Initially ecp2009pr dataset had observations of 50,900 for both male and

[10] See http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=3889&lang=en&db=imdb&adm=8&dis=2 for more details on the Survey of Labour and Income Dynamics (SLID).

[11] Census data is not used as the limitations of Census data in labour economics is well documented [Killingsworth (1983); Angrist and Krueger (1999)]. Income variables are based on

female individuals, and the ec2009ef dataset had observations of 26,650 households. In order to match the identity of the given female individual across the two datasets that allows us to match the data from different datasets to the right person, the two datasets were merged. After merger, data on 32,065 females who are in and out of the labour force remain. Out of the 32,065 females, the composite hourly wage of all paid jobs were observed for 16,371 females, the total hours paid all jobs observed for 24,009 females, age of 28,325 females, marital status of 28,264 females, 28,325 of females living with a spouse and not, the number of years of work experience of 24,864 females, support payments of 28,325 females, highest level of education of 28,204 females, 32,065 of females living with a child less than six years old and not, and the non-female income of 28,325 females in total were observed. See the summary statistics in Table 1.3 for a more detailed account of all the variables used in the analysis.

Figure 1.3: Histogram of *hours of labour*

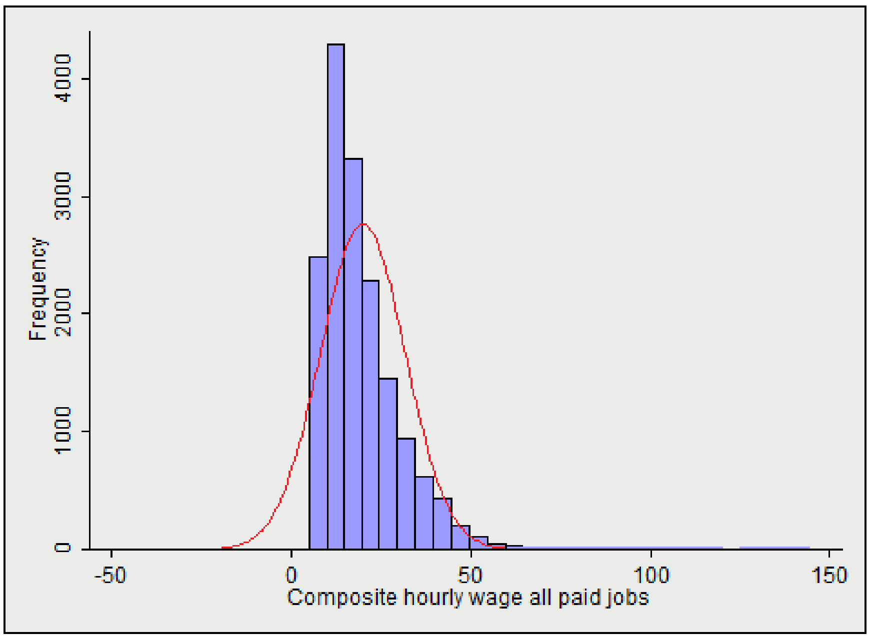


The *hours* variable consists of 24009 observations with a mean of 1129.835 and a standard deviation of 922.4242. Although the histogram of the hours of labour does not look "normal", in order to ensure that the probability

respondents' memory and willingness to disclose this information that is mostly underreported in the Census.

distribution of the sample average of the *hours* variable follows a normal curve the bootstrap technique was used. It is important for the data to be normally distributed, as without it our statistical tests will not hold. After using the bootstrap technique, the sample average of the variable *hours* is likely to be normally distributed from 50 simulations with a 95% confidence interval of [118.33, 1141.34] and a bootstrap standard error of 5.869992.

Figure 1.4: Histogram of *wage*



The *wage* variable consists of 16371 observations with a mean of 19.89017 and a standard deviation of 11.81493. Likewise, after using the bootstrap technique, the sample average of the variable *wage* is likely to be normally distributed from 50 simulations with a 95% confidence interval of [19.70432, 20.07602] with a bootstrap standard error of .094824.

Table 1.4 shows that the out of 28,264 observations on the marital status of females, 49% are married, 8.8% are in common-law relationship, 3.5% are separated, 6.7% are divorced, 9.82% are widowed, and 22.2% are singles. Additionally, out of 28,325 observations on females living with spouse and not, 59.3% of females are living with spouse and 40.7% are not (Table 1.5). In Table 1.6, it is noted that out of 31,819 observations on females from the ten Canadian provinces, 4.4% are from Newfoundland and Labrador, 2.7% are from Prince Edward Island, 5.9% are from Nova Scotia, 5.8% are New Brunswick, 19.3% are from Quebec, 28.2% are from Ontario, 6.7% are from Manitoba, 7.2% are from Saskatchewan, 10% are from Alberta, and last but not the least 9.8% are from British Columbia. By continuing this way, it is further noted that out of 28,204 observations on the highest level of education of female, 0.4% have never attended school, 0.8% have 1-4 years of elementary school, 7.2% have 5-8 years of elementary school, 7.2% have 9-10 years of elementary and secondary school, 6.6% have 11-13 years of elementary and secondary school (but did not graduate), 15.8% have graduated high school, 7.2% have some non-university postsecondary (no certificate), 5.6% have some university (no certificate), 30.3% have non-university postsecondary certificate, 2.2% have university certificate below Bachelor's, 12.2% have Bachelor's degree, and 4.4% have university certificate above Bachelor's , Master's, First professional degree in law, Degree in medicine, dentistry, veterinary medicine or optometry, Doctorate (PhD) (Table 1.7). And lastly, the *kidslt6* variable that was created as an indicator variable by generating a variable less than six from the age of youngest person in economic family shows that out of 32,065 observations, only 9% of women in the sample have a child less than six years old and 91% do not (Table 1.8).

In order to obtain the desired parabolic relation, i.e., the backward-bending effect between hours and wage, the square of wage is used as an independent variable. Due to the non-linear relation of age and experience on hours in the existing literature, squares of age and experience are included. The variable province is included to account for the regional differences in labour opportunities captured by regional dummies, and to account for the strong correlation between human capital and labour supply, dummies for the highest level of education attained by the individual female are also included. Other variables in the model are included for similar reasons as well as for purposes of expanding on previous studies concerning the labour supply schedule of Canadian women.

The indicators were coded and the codes were kept for identification purposes in raw data. The males' earnings or non-female income was measured by subtracting the earnings of the female individual from the total income of a household. The total income of a single household was measured by summing up market income, old age security pension, other government transfers, other taxable income, private retirement pensions, social assistance, universal child care tax benefit, employment insurance benefits, wages and salaries before deductions, and workers' compensation benefits.

VI. Empirical Findings

1. *Interpretation of OLS Estimates for Canadian Women:*

The OLS results of the multiple regression model (1) for hours of work on the independent variables is for women in the labour force (Table 1.9). Based on the results, wage has a significant positive effect on hours of work until a turning point of negative $10.9/hour is reached, and beyond this value wage has a negative impact on hours of work. This means that hours of work increase with wage at a decreasing rate and this relation gives a backward-bending supply of labour for Canadian women. The elasticity at the mean hours and wage is -0.02.

The effect of age on hours of work is significantly positive until a woman reaches a turning point of 40 years of age, and beyond this value age has a negative impact on hours of work. This means that hours of work increase with age at a decreasing rate. In addition, husband's income surprisingly has a very significant positive effect of .008 hours per year on females' hours of work, however, this effect is economically insignificant. Regarding the support payments received by the individual female, the effect is negative effect on hours of work by .013 hours per year and although the effect is statistically significant, it is not economically significant. On the other hand, if a female is living with a child less than six years old then not surprisingly this will have a negative effect on her hours of labour compared to a female who does not have a child less than six years old. This effect is both economically and statistically significant. The effects of indicator variables of the individual female on her hours of work such as the highest level of education she attained and her marital status do not appear statistically significant, although some of their categories are economically significant.

However, most importantly, if a female is not living with a spouse then her hours of labour would increase by 77.14 hours per year compared to a female who is living with a spouse. This effect is statistically and economically significant. Moreover, if a woman is living with a child less than six years old then her hours of work reduces by 193.2 hours per year compared to a woman not living with a child less than six years old. This effect is statistically and economically significant.

Note that this multiple regression model doesn't include variables such as experience and province which may affect a woman's hours of work. Besides, by running the Breusch-Pagan test it is found that the model contains heteroskedasticity, which is the reason why the heteroskedasticity-robust standard errors are reported (Table 1.9). Furthermore, the model suffers from functional form misspecification as discovered after running a Ramsey Regression Equation Specification Error Test (RESET). Moreover, we only observe the hours equation for the individual females who worked in 2009 and not for the ones who did not work. Hence, we have a selection bias problem [Gronau (1974), Lewis (1974)]. Therefore, in order to test and correct for sample selection bias due to unoberservability of the wage offer for nonworking women we need to estimate a probit model for labour force participation.

2. *Interpretation of Probit Estimates for Canadian Women:*

The probit estimates of the first step of the Heckman procedure is reported first. In the probit model, female’s age, years of experience, highest level of education she attained, and the province in which she lives have a strong effect on her labour force participation.

In Table 2.0, the probit regression coefficients give the change in the z-score or probit index for a one unit change in the predictor. It is noted that a one unit increase in *age* increases the z-score by .041 and a one unit increase in *agesqrd* decreases the z-score by .001. These coefficients are significant at 99% confidence interval. The scaled probit coefficients for *educ* and *educsqrd* are roughly .4(.041) ≈ .02 and .4(-.001) ≈ - 0.0004 respectively, meaning that a one unit increase in *edu* roughly increases the likelihood of a woman’s labour force participation by .02. And, on the other hand, a one unit increase in *edusqrd* roughly decreases the likelihood of a woman’s labour force participation by 0.0004. Likewise, for a one unit increase in *exper*, the z-score increases by .09 and for a one unit increase in *expersqrd*, the z-score decreases by 0.001. Both of the coefficients are very statistically significant. The scaled probit coefficients for *exper* and *expersqrd* are roughly .036 and -0.004 respectively, indicating that a one unit increase in *exper* increases the likelihood of woman’s labour force participation by approximately .036 and on the other hand, a one unit increase in *expersqrd* decreases her labour force participation with a probability of roughly.0004.

In addition, the indicator variables for *educ* also appear statistically significant suggesting that for example, a female having graduated high school versus no years of schooling (base group), increases the z-score by 1.36. The marginal effect for each of the highest level of education attained by the female individual has a positive effect on her probability of working, although with diminishing returns with higher levels of education.

In terms of the residence of the female affecting her labour participation, most of the indicators of *province* appear statistically insignificant without the exception of the female residing in P.E.I and Ontario. It is noted that a one unit increase in the female living in P.E.I, increases the z-score by .301 compared to the female living in Newfoundland (base group). On the other hand, a one unit increase in the female living in Ontario, decreases the z-score by .146 compared to the female living in Newfoundland. Furthermore, if a woman is residing in P.E.I then this increases her probability of working by approximately 0.1204 compared to a woman living in Newfoundland. On the contrary, a woman living in Ontario decreases her probability of working by approximately .06. The change in the probability of working per unit change in each independent variable of the probit regression is reported, and the pseudo R-squared for the probit equations is 0.17 (Table 2.0). Therefore we cannot use these estimated equations to make accurate predictions about whether any particular woman will choose to work.

3. *Interpretation of Heckit Estimates for Canadian Women:*

The estimated probit coefficients were used to compute the normal probability of working for each female which in turn was used for the Heckit estimates [Nakamura and Nakamura (1981)]. From the Heckit results in Table 2.1, there is evidence of a sample selection problem in estimating the hours of work equation (1). The coefficient of the inverse Mill's ratio ($\hat{\lambda}$) has large t statistic, so we fail to reject H_0: $\rho = 0$. Just as importantly, there are no practically large differences in the estimated slope coefficients in Table 2.1, other than female's age which differs by 19.4 years. In addition, the factors that appear statistically significant on hours of work in the OLS results also appear statistically significant in the Heckit results.

The wage has a significant positive effect on hours of work until a turning point of negative $758.33/hour is reached, and beyond this value wage has a negative impact on hours of work. This means that hours of work increase with wage at a decreasing rate and this relation gives a backward-bending supply of labour for Canadian women. The elasticity at the mean hours and wage is -0.16.

Very similar to the OLS results, the effect of age on hours of work is significantly positive until a woman reaches a turning point of 40 years of age, and beyond this value age has a negative impact on hours of work. Hence, hours increase with age at a decreasing rate. Husband's income and support payments received by a woman are economically insignificant, while the indicator variables of a woman living with a spouse and a woman having a child less than six years old respectively are economically significant in Heckit results.

A possible explanation of the puzzling positive relationship between husband’s income and woman’s hours of labour that conflicts with the findings of the Nakamuras (1981) and Robinson and Tomes (1985) may be due to “assortative mating”[12]. Assortative mating is a term widely used to refer to the positive correlation between the traits of husbands and wives [Liu and Lu (2006)]. Becker [(1973, 1974)] investigated the reasons for assortative mating, and its effects on various social issues and his work has motivated many researchers such as Boulier and Rosenzweig (1984); Burdett and Coles (1997); Kremer (1997); Fernandez (2001); Fernandez, Guner, and Knowles (2001); Fernandez and Rogerson (2001); Pencavel (1998); Ermisch and Francesconi (2002) to study the mechanisms that relate assortative mating with inequality and their quantitative importance. Liu and Lu say that “these studies (of or related to assortative mating) are accompanied by a few empirical papers (Mare 1991; Mancuso 2000) that document the evolution of assortative mating, particularly educational assortative mating” [Liu and Lu (2006)]. For example, it is more likely that a “successful” woman will marry a man who is “successful” because of social norms and other reasons, say a female doctor marrying another male doctor not only because of security reasons but also because of common interests, lifestyle choice, etc.

However, note that the slope coefficients for the highest level of a female’s education are all negative in Heckit results compared to its slope coefficients in probit results. This could mean that the more educated the female is the less she works, i.e., education gets people in the labour force but does not influence their hours once they are already in. There isn’t a strong correlation between education and preference for leisure. On the other hand, marital status for most type has a positive effect on hours compared to the female being married (base group). Although, a widow works less than a married woman by 73.3 hours per year, none of the effects of types of marital status are statistically significant even though they can be considered economically significant.

An important issue regarding the Heckit model addressed: If the errors of the selection equation, the regression equation, or both are heteroskedastic, it is

[12] To check for educational assortative mating, the husband’s education variable was added to the actual data that contains only females. After running a single regression of husband’s education on female’s education, a positive correlation for each level of education was found. Hence, husband’s education was added to the model to see how it affects the results. However, it must be noted that adding husband’s education to the model did not change the Heckit results that much. Most importantly, since adding husband's education to the model still results in a positive coefficient of non-female income in the Heckit, the sorting is not on education even though there is a positive correlation among husband's and wife's education. Therefore, the Heckit results with the inclusion of husband’s education to the model are not reported in this paper. Moreover, the existing literature of labour supply of women doesn't include this kind of variable.

well-known that the usual two-stage and maximum likelihood estimators are inconsistent [Adkins and Hill (2004)]. Although there are several ways of dealing with this problem[13], it is well beyond the scope of this study as of this moment to delve into such complexities.

Quite similar to El-Hamidi (2003), I make two general comments regarding Table 1.9: first, the low R-squared value of 0.143 implies that there is still a wide range of unidentified determinants explaining the decision to work extra hours or not. Second, these results suggest that the category of 24-60 years of age is too diverse a group to have one labour supply function. Thus, as El-Hamidi (2003) proposes “an analysis of the determinants of labour supply using a disaggregated database should be the focus of further empirical investigations” [El-Hamidi (2003)].

VII. Summary and Conclusion

Past studies on the labour supply of married Canadian women by Alice Nakamura and Masao Nakamura (1981), and Robinson and Tomes (1985) have found that the labour supply schedule of working women is backward bending with elasticity similar in magnitude to typical estimates reported for males. The major goal of this paper was to re-examine the issue with more recent data as of 2009 to provide a better understanding of both hours worked and wage rates. The results of this paper offer strong support for the conclusions reached by them. The markedly backward-bending shape of the labour supply curve of working Canadian women suggests that the income elasticity of demand for leisure is larger relative to the substitution effect for women than for men in Canada.

However, the results reported by Robinson and Tomes (1985) may suggest that the contrasting secular trends observed in the labour supply of men and women are the consequences of the differential responsiveness of male and female labour force participation to opportunities, rather than the hours worked by men and women [Robinson and Tomes (1985)]. Additionally, the slope coefficients of the OLS and Heckit estimates do not vary by a large extent in terms of their economic and statistical significance, even though there is evidence

[13] It has been mentioned by Adkins and Hill (2004) that “Donald (1995) has studied this problem and suggested a semiparametric estimator that is consistent in heteroscedastic selectivity models. Chen & Khan (2003) has also proposed a semiparametric estimator of this model. More recently, Lewbel (2003) has proposed an alternative that is both easy to implement and robust to heteroskedastic misspecification of unknown form.” The authors themselves proposed a “simple estimator that is easily computed using standard regression software”, and studied the performance of the estimator in a small set of Monte Carlo simulations.

of selectivity bias in the OLS hours equation. Furthermore, assortative mating is likely to play a fundamental role in explaining the positive relationship between husband's income and the woman's hours of labour that conflicts with the findings of the Nakamuras (1981) and Robinson and Tomes (1985). Lastly, although by ignoring the issue of heteroskedasticity the usual 2-stage Heckit method becomes seriously biased and subsequent t-tests of regression coefficients can suffer from large "size distortion", the Heckit method is relatively simple to implement in situations discussed.

Appendix

Figure 1.2: The backward-bending labour supply curve

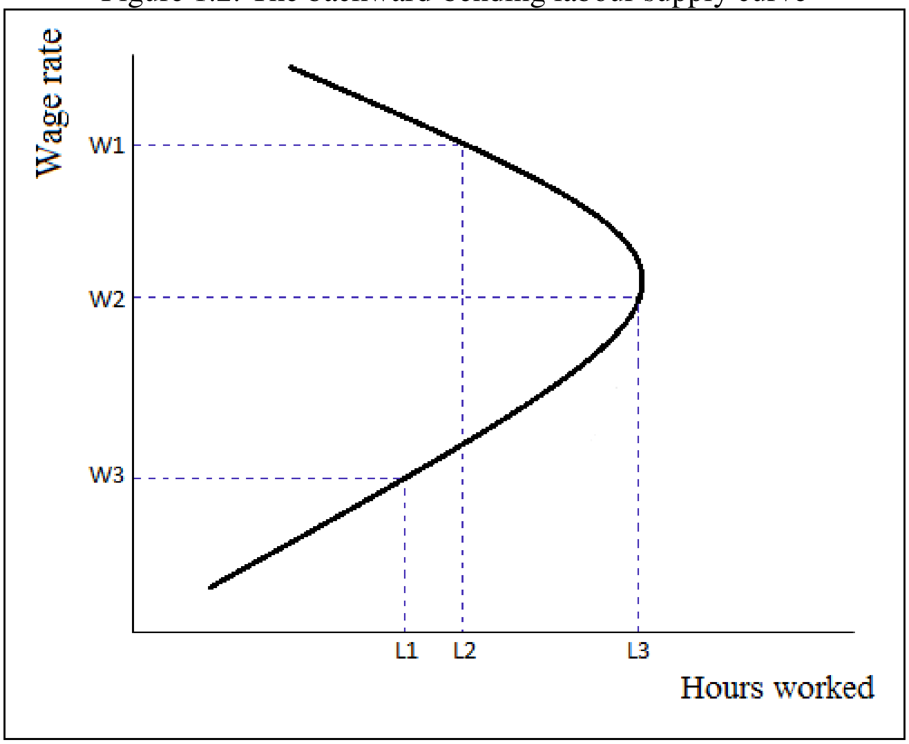


Table 1.2: Variable Descriptions

hours	total hours paid all jobs during 2009
wage	composite hourly wage all paid jobs in 2009
wagesqrd	the square of composite hourly wage all paid jobs
age	female's age, 2009, external cross-sec file
agesqrd	the square of female's age
marst	marital status of female as of December 31 of 2009
	1 – female is married
	2 – female is in a common-law relationship
	3 – female is separated
	4 – female is divorced
	5 – female is widowed
	6 – female is single (never married)
fslsp	female is living with spouse in 2009
	1 – Yes
	2 - No
province	Province of residence group, household, December 31, 2009
	10 - Newfoundland and Labrador
	11 – Prince Edward Island
	12 – Nova Scotia
	13 – New Brunswick
	24 – Quebec
	35 – Ontario
	46 – Manitoba
	47 – Saskatchewan
	48 – Alberta
	59 – British Columbia
exper	number of years of work experience, full-year full-time
expersqrd	the square of number of years of work experience, full-year full-time
alimo	Support payments received
nonfemaleincome	income of non-female in the household
kidslt6	female with a child less than six years old
working	total hours paid all jobs greater than zero

Table 1.2: Variable Descriptions (Continued)

educ	Highest level of education of female, 1st grouping 1 - Never attended school 2 - 1-4 years of elementary school 3 - 5-8 years of elementary school 4 - 9-10 years of elementary and secondary school 5 - 11-13 years of elementary and secondary school (but did not graduate) 6 - Graduated high school 7 - Some non-university postsecondary (no certificate) 8 - Some university (no certificate) 9 - Non-university postsecondary certificate 10 - University certificate below Bachelor's 11 - Bachelor's degree 12 - University certificate above Bachelor's, Master's, First professional degree in law, Degree in medicine, dentistry, veterinary medicine or optometry, Doctorate (PhD)

Table 1.3: Summary Statistics of Canadian women

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
puchid25(id)	32065	4012858	7414.513	4000001	4025693
province	31819	33.74845	14.69714	10	59
agyfm	32065	38.72475	25.07988	0	80
agyfmg46	32065	5.924965	2.56457	1	9
alimo46	32065	263.0711	1860.065	0	45000
earng46	31745	51132.91	63660.3	0	1387250
age	17042	43.26998	10.50669	24	60
marst	28264	2.8629	2.118468	1	6
fslac	28325	1.907326	.2899806	1	2
fslsp	28325	1.406884	.4912616	1	2
hours	24009	1129.835	922.4242	0	5200
wage	16371	19.89017	11.81493	6	142
exper	24864	14.9928	13.18434	0	50
alimo	28325	249.0071	1825.297	0	45000
earng42	28108	20899.72	28372.56	0	539000
mtinc42	28179	25065.66	30446.84	0	680000
oas42	28325	1210.796	2430.963	0	7750
ogovtr42	28325	33.60018	181.1052	0	2400
ottxm42	28325	561.278	4202.446	0	120000
prpen42	28325	2120.96	7977.688	0	185000
sapis42	28325	406.2242	2022.65	0	25000
uccb42	28325	139.9682	495.2109	0	7800
uiben42	28325	757.8279	2789.844	0	31000
wgsal42	28325	19643.28	27591.65	0	525000
wkrcp42	28325	130.5137	1279.867	0	32000
educ	28204	7.580946	2.599754	1	12
totalfemincome	28179	50174.48	56331.64	0	1110900
nonfemincome	28067	29301.02	32393.06	0	680000
wagesqrd	16371	535.2028	918.9231	36	20164
agesqrd	28325	2642.723	1801.337	256	6400
expersqrd	24864	398.6038	528.935	0	2500
kidslt6	32065	.0902542	.28655	0	1
working	32065	.8051458	.3960946	0	1

Table 1.4: Marital Status of Canadian women

Marital Status	Frequency	Percent	Cumulative
1 – female is married	13,841	48.97	48.97
2 – female is in a common-law relationship	2,485	8.79	57.76
3 – female is separated	982	3.47	61.24
4 – female is divorced	1,900	6.72	67.96
5 – female is widowed	2,776	9.82	77.78
6 – female is single (never married)	6,280	22.22	100.00
Total	28,264	100.00	

Table 1.5: Canadian women living with spouse or not

Living with spouse or not	Frequency	Percent	Cumulative
1 - Yes	16,800	59.31	59.31
2 - No	11,525	40.69	100.00
Total	28,325	100.00	

Table 1.6: Residence of Canadian women

Province	Frequency	Percent	Cumulative
10 - Newfoundland and Labrador	1,390	4.37	4.37
11 – Prince Edward Island	870	2.73	7.10
12 – Nova Scotia	1,877	5.90	13.00
13 – New Brunswick	1,849	5.81	18.81
24 – Quebec	6,136	19.28	38.10
35 – Ontario	8,976	28.21	66.31
46 – Manitoba	2,124	6.68	72.98
47 – Saskatchewan	2,304	7.24	80.22
48 – Alberta	3,172	9.97	90.19
59 – British Columbia	3,121	9.81	100.00
Total	31,819	100.00	

Table 1.7: Highest level of education attained by Canadian women

Highest level of education	Frequency	Percent	Cumulative
1 - Never attended school	111	0.39	0.39
2 - 1-4 years of elementary school	227	0.80	1.20
3 - 5-8 years of elementary school	2,025	7.18	8.38
4 - 9-10 years of elementary and secondary school	2,037	7.22	15.60
5 - 11-13 years of elementary and secondary school (but did not graduate)	1,869	6.63	22.23
6 - Graduated high school	4,449	15.77	38.00
7- Some non-university postsecondary (no certificate)	2,037	7.22	45.22
8 - Some university (no certificate)	1,584	5.62	50.84
9 - Non-university postsecondary certificate	8,548	30.31	81.15
10 - University certificate below Bachelor's	617	2.19	83.34
11 - Bachelor's degree	3,447	12.22	95.56
12 - University certificate above Bachelor's, Master's, First professional degree in law, Degree in medicine, dentistry, veterinary medicine or optometry, Doctorate (PhD)	1,253	4.44	100.00
Total	28,204	100.00	

Table 1.8: Canadian women with or without a child less than six years old

Child less than six years old or not	Frequency	Percent	Cumulative
1 - Yes	29,171	90.97	90.97
2 - No	2,894	9.03	100.00
Total	32,065	100.00	

Table 2.9: OLS Estimates for Canadian Women

Dependent Variable: hours of work	
Independent Variables	Coefficient
composite hourly wage of all paid jobs	-1.42
	[2.70]
the square of composite hourly wage of all paid jobs	-.065**
	[.0327]
female's age	39.23***
	[5.01]
the square of female's age	-.49***
	[.06]
1 - Never attended school (base group)	---
2 - 1-4 years of elementary school	-104.7
	[201.5]
3 - 5-8 years of elementary school	65.4
	[115.8]
4 - 9-10 years of elementary and secondary school	90.5 [110.1]
5 - 11-13 years of elementary and secondary school (but did not graduate)	21.25 [111]
6 - Graduated high school	117.3
	[105.5]
7 - Some non-university postsecondary (no certificate)	4.36
	[106.9]
8 - Some university (no certificate)	-14.6
	[107.8]
9 - Non-university postsecondary Certificate	85.8 [105.2]
10 - University certificate below Bachelor's	61.8 [109.1]
11 - Bachelor's degree	48
	[106.2]
12 - University certificate above Bachelor's, Master's, First professional degree in law, Degree in medicine, dentistry, veterinary medicine or optometry, Doctorate (PhD)	51.84 [107.8]

Table 3.9: OLS Estimates for Canadian Women (Continued)

female is living with spouse (base group)	---
female is not living with spouse	77.14 ***
	[28]
income of non-female in the household	.008***
	[.0007]
1 – female is married (base group)	---
2 – female is in a common-law relationship	29.3
	[15.98]
3 – female is separated	18.8
	[35.14]
4 – female is divorced	20.65
	[33.11]
5 – female is widowed	-78.7
	[54.71]
6 – female is single (never married)	-23.2
	[29.9]
Support payments received	-.013***
	[.003]
female without a child less than six years old (base group)	---
female with a child less than six years old	-193.2***
	[17.73]
Constant	606.7
	[149.9]
Sample size	12469
R-squared	0.143

* Statistical significance at the 90% level

** Statistical significance at the 95% level

*** Statistical significance at the 99% level

[ ] Heteroskedasticity-robust standard error

Table 2.0: Probit Estimates for Canadian women

Independent Variables	Coefficient	ΔP(*working*) per unit Δindependent variable
female's age	.041*** (.012)	.0164
the square of female's age	-.001*** (.0001)	-.0004
number of years of work experience, full-year full-time	.09*** (.004)	.036
the square of number of years of work experience, full-year full-time	-.001*** (.0001)	-.0004
1 - Never attended school (base group)	---	---
2 - 1-4 years of elementary school	.61 (.441)	.244
3 - 5-8 years of elementary school	.87** (.35)	.348
4 - 9-10 years of elementary and secondary school	1.11*** (.351)	.444
5 - 11-13 years of elementary and secondary school (but did not graduate)	1.16*** (.354)	.464
6 - Graduated high school	1.36*** (.35)	.544
7 - Some non-university postsecondary (no certificate)	1.25*** (.35)	.5
8 - Some university (no certificate)	1.34*** (.35)	.536
9 - Non-university postsecondary certificate	1.56*** (.35)	.624
10 - University certificate below Bachelor's	1.64*** (.36)	.656
11 - Bachelor's degree	1.8*** (.35)	.72
12 - University certificate above Bachelor's, Master's, First professional degree in law, Degree in medicine, dentistry, veterinary medicine or optometry, Doctorate (PhD)	1.96*** (.353)	.784
10 - Newfoundland and Labrador (base group)	---	---

Table 2.0: Probit Estimates for Canadian women (Continued)

11 – Prince Edward Island	.301***	.1204
	(.108)	
12 – Nova Scotia	-.1	-.04
	(.082)	
13 – New Brunswick	-.001	-.0004
	(.083)	
24 – Quebec	-.08	-.032
	(.07)	
35 – Ontario	-.146	-.0584
	(.07)	
46 – Manitoba	.044	.0176
	(.081)	
47 – Saskatchewan	.0454	.0182
	(.081)	
48 – Alberta	.052	.0208
	(.076)	
59 – British Columbia	-.106	-.0424
	(.076)	
constant	-1.22	---
	(.427)	
Pseudo R-squared	0.17	---
Proportion of women who worked	0.42	---
Final value of log of likelihood function	-5637.7	---

* Statistical significance at the 90% level

** Statistical significance at the 95% level

*** Statistical significance at the 99% level

( ) Usual standard error

Table 2.1: Heckit Estimates for Canadian Women

Dependent Variable: hours of work	
Independent Variables	Coefficient
composite hourly wage of all paid jobs	-9.1***
	(1.41)
the square of composite hourly wage of all paid jobs	-.006 (.015)
female's age	19.8***
	(5.13)
the square of female's age	-.235***
	(.061)
1 - Never attended school (base group)	---
2 - 1-4 years of elementary school	-84.8
	(334.3)
3 - 5-8 years of elementary school	-18.02
	(280)
4 - 9-10 years of elementary and secondary school	-50.34 (278.3)
5 - 11-13 years of elementary and secondary school (but did not graduate)	-148.6 (279.2)
6 - Graduated high school	-67.43
	(277.2)
7 - Some non-university postsecondary (no certificate)	-188.9 (277.7)
8 - Some university (no certificate)	-202.9
	(278.2)
9 - Non-university postsecondary certificate	-125.9 (277.1)
10 - University certificate below Bachelor's	-183.8 (279.1)
11 - Bachelor's degree	-171.1
	(277.4)
12 - University certificate above Bachelor's, Master's, First professional degree in law, Degree in medicine, dentistry, veterinary medicine or optometry, Doctorate (PhD)	-174.3 (278.1)

Table 2.1: Heckit Estimates for Canadian Women (Continued)

female is living with spouse (base group)	---
female is not living with spouse	60.9**
	(25.6)
income of non-female in the household	.01***
	(.0003)
1 – female is married (base group)	---
2 – female is in a common-law relationship	19.5
	(17)
3 – female is separated	24.6
	(34.52)
4 – female is divorced	20.3
	(31.3)
5 – female is widowed	-73.3
	(50.9)
6 – female is single (never married)	-7.3
	(27.8)
Support payments received	-.013***
	(.003)
female without a child less than six years old (base group)	---
female with a child less than six years old	-172.2***
	(17.3)
Constant	1292.3
	(299.2)
$\hat{\lambda}$ (Selectivity bias)	-314.8
	(18.12)
Sample size	13515

* Statistical significance at the 90% level

** Statistical significance at the 95% level

*** Statistical significance at the 99% level

( ) Usual standard error

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