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# The Effect of High School Employment on Educational Attainment in Canada

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**Abstract:** The objective of this paper is to assess the impact of working in the twelve months preceding the date of leaving high school, either as a graduate or as a dropout, on the probability of graduation. To do so, I use Statistics Canada's 1991 School Leavers Survey and its 1995 Follow-up. Given that both the decision to graduate and the decision to work are endogenous variables, I use local labour market conditions as an exclusion restriction. The results show a strong negative effect of working while in school on the probability of graduation for men. Specification checks show that this negative impact is driven by variations in hours worked induced by favourable local labour market conditions for those working a relatively large number of hours per week. The results for females are somewhat inconclusive due in part to the rejection of the exclusion restrictions.

**Keywords:** High school non-completion, Local labour market conditions, Instrumental variables

**JEL Classification:** I2, C3

# 1 Introduction

Whether high school employment is beneficial or not has been extensively researched in the United States over the last two decades. Interest in this question arises in part from concerns that early work experience while enrolled in high school may hinder school performance and hence the accumulation of human capital. Others, however, have argued that early exposure to the labour market might actually lead young individuals to develop other aspects such as a greater sense of responsibility, better discipline, etc. In addition it is not clear that investments made early in work experiences may not provide long term benefits. For example, the inherent search process involved might help young people decide what they intend to do later. Moreover, some of the skills acquired on-the-job are likely to be transferable across employers and thus potentially help increase future wages.

While some of the earlier studies (e.g. Greenberger and Steinberg (1986)) tend to find negative impacts, more recent work by Eckstein and Wolpin (1999), Oettinger (1999) and Ruhm (1997) shows that far from being the case that all work is detrimental, modest involvement in work activities actually lead to positive outcomes.[1] In particular, Ruhm finds strong evidence that early work experience leads to higher future wages and better fringe benefits. Additionally, closer to this paper's focus, he finds that students working 10 hours per week during their senior year have a higher graduation probability from high school than those who do not work at all, although heavier work commitment is associated with a lower probability of graduation. Overall then, results are ambiguous regarding the impact of work while in school on educational attainment as measured by the high school graduation probability.

As pointed out by both Oettinger and Ruhm, early studies often suffer from the fact that work while in school is treated as an exogenous variable affecting other outcomes of interest. It is clear that such a strong assumption is likely to be violated. Ideally, one would like to be able to explicitly model the decision to work or the number of hours worked so as to treat both the educational attainment outcome and the hours worked outcome as representing a system of endogenous variables.

The objective in this paper is to examine with Canadian data the causal impact of working while in school on the decision to complete high school or not. The data used come from both the original 1991 wave of Statistics Canada's School Leavers' Survey (SLS) as well as the Follow-up in 1995. The original 1991 survey contains information on hours worked in the twelve months preceding the date of leaving school, either as a dropout or as a graduate. However, a non-negligible fraction of the individuals surveyed in 1991 were still enrolled in high school. Consequently, using the 1995 follow-up allows one to know whether those respondents graduated or not from high school and if they graduated, whether they

[1] See Ruhm (1997) for an extensive literature review. While Ruhm focuses on future labour market outcomes, Oettinger (1999) analyzes the effect of work on educational performance through its impact on the grade-point average.

entered into post-secondary education. Auxiliary data on the conditions of the local labour market in which these young individuals lived will be used as the main source of variation in work incidence (and intensity) while in school.

The results show that men are sensitive to job opportunities that present themselves while they are enrolled in school and those job opportunities in turn lead to a large reduction in the probability of graduating from high school. Additionally, I am able to provide evidence that the exclusion restrictions are acceptable by using multiple measures of labour market conditions interacted with other exogenous variables to overidentify the system. This is perhaps particularly important in the present context since one can easily argue that labour market conditions directly affect the decision to graduate at the same time as they affect the decision to work while in high school. Further specification checks are strongly suggestive that the bulk of the negative impact of working while in school is driven by instrument-induced variations in hours worked at a relatively large number of hours. Perhaps more to the point, while the instruments have good explanatory power for jobs in which young people work at least ten (or fifteen or twenty) hours per week, they are weak in explaining variations in hours worked below ten (or fifteen or twenty). Consequently, a conservative assessment on the issue of whether modest work involvement while in school is beneficial or not is that it is left unresolved.[2] Note that the results for men contrast with the simple raw correlation between work incidence and graduation incidence, which is positive. In fact, the correlation between graduation rates and hours worked while in school is positive over a fairly wide range of hours worked.

As for women, the results are rather inconclusive. On the one hand, the hypothesis that the two measures of local labour market conditions are valid instruments is rejected whether those two measures are interacted with other regressors or not. In other words it appears as though labour market conditions can explain part of the variation in the high school graduation behaviour of females independently of their effect on getting a job prior to either completing high school or leaving it without completing. Overall, then, a cautious assessment would be that these results suggest that the high school graduation process for females is different than it is for males. Interestingly, earlier work with Paul Beaudry and Thomas Lemieux (Beaudry, Lemieux, and Parent (2000)) using cruder aggregate data linking the times series of school enrollment by province to the unemployment rate of workers aged between 25 and 44 showed results that were also suggestive of a different school enrollment decision process for females.

At least in the case of men, these results are different from the U.S estimates, where local

[2]However, modelling the joint decision to work/graduate through a bivariate probit allows the estimation of a strong positive correlation between the unmeasured individual characteristic that makes people more likely to work at the same time as it makes them more likely to graduate. So, even though the instruments are too weak to provide identification for hours worked below fifteen, the assumed structure still allows the identification of a negative impact of hours worked on the probability of graduation. Of course, the credibility of the estimated negative impact then rests entirely on the assumed model. This is also true for women.

labour market conditions have been found not to be a good predictor of hours worked while in school (Oettinger (1999),Ruhm (1997)). In fact, this extra sensitivity of Canadians to the "treatment" consisting of working while in school may provide a partial explanation as to why the high school completion rate in the U.S has historically always been higher than in Canada: one of the mechanisms leading young males to leave school before completion seems to have been much more important empirically in Canada than in the United States. As mentioned above, the fact that the instruments' validity appears questionable in the case of females precludes the identification of the same mechanism as an important determinant of high school completion.

## 2 The School Leavers Survey and its Follow-up (SLS)

In 1991, Statistics Canada collected information on the school and post-school labour market experiences of 9,460 young people aged 18 to 20. One of the main purposes of that survey was to estimate the high school completion rate. The original sample was drawn from the Family Allowances File, as they were the most complete listings of individuals under the age of 15 in Canada. Five years of Family Allowances Files were used to generate a sampling frame of 18-20 year-olds. Of the 18,000 individuals who were selected to be in the sample 10,782 were successfully traced and 9,460 responded. The interviews took place between April and June of 1991.

In 1994, Human Resources Development Canada commissioned Statistics Canada to re-interview the same individuals in 1995. For that interview, the response rate was 66.8% as 6,284 individuals provided information on their schooling and labour market experiences. These individuals were thus aged 22 to 24 at the time of the re-interview and, as a consequence, the data are best suited for studying the early labour market experiences of the less educated among them.

The sample used includes 5,368 respondents from the Follow-up with no missing information on any of the relevant variables. I then create a dummy variable equal to one if each respondent has graduated from high school or not. The analysis is carried out separately for men and women.[3] In terms of work incidence I make use of two questions. The first one asks the respondent whether she/he had "a job during the last school year". The second ones asks the number of weekly hours worked on that job. It is important to emphasize that the question specifically asks the respondents about jobs held during the school year excluding

[3]Given that they were aged 18 to 20 at the time of the original interview in 1991, many were still enrolled in high school. Using data from the 1995 Follow-up allows me to use information at a time when the individuals should be well past their high school days. In fact, although there are respondents who report being enrolled in high school in 1995 (when they are between 22 and 24), the number of such cases is very small. Those observations were deleted. Also excluded from the sample are individuals who do not reside in one of the ten provinces. Although 40% of the individuals present in the School Leavers Survey Follow-up have at most a high school diploma, using the sample weights brings the estimated population proportion to about 30%, which corresponds closely to the percentage of individuals aged 25-26 in the (much larger) 1998 labour Force Survey who report having at most a high school diploma.

the summer.

The main source of arguably exogenous variation in work incidence (and intensity) while in school I use consists of two measures of local labour market conditions. The first one is the unemployment rate in the Census Metropolitan Area if the individual studied in a CMA; otherwise I use the province average excluding the CMA's. The second measure is simply the province-wide unemployment rate for workers aged 25 to 44. Therefore, I have both cross-sectional differences in the unemployment rate in a given year and time differences within a particular region, given that those who left high school before completion did so over a number of years.

For those who do not complete high school, I use the unemployment rate that prevailed at the time (month) they quit school. For those who graduate, I use the annual average computed over the last four years by CMA or province. Note that it does not make any qualitative difference whether or not the average is computed over a shorter period of time instead of four years or whether I use either the time of graduation unemployment rate for high school completers or the annual average unemployment rate in the years leading to the date at which students dropped out of high school.

## 2.1 Summary Statistics

Table 1 shows some simple descriptive statistics documenting the differences in individual characteristics by schooling attainment. In terms of family background variables, it seems clear that high school graduates come from families with better educated parents than is the case for dropouts (with no post-secondary education) and, also, they performed substantially better when they attended school, as reflected by the much higher proportion of individuals with a B grade point average or better. They also were less likely to have failed a grade in elementary school. This last piece of information suggests that, at least to a degree, poor performances in school precede the process by which students start to contemplate dropping out of high school, instead of the idea of dropping out subsequently affecting school performance.

It is interesting to note that the characteristics of the dropouts who did pursue post-secondary education are different from the characteristics of the "real" dropouts on one important dimension: they are more likely to come from more educated families although they performed just as poorly in class. In fact, their parents are more educated than those of high school graduates. In terms of employment rates, dropouts with some additional post-secondary schooling are doing just as well as high school graduates.

Looking at the incidence of work while in high school and its relation to completion rates, we can see that in fact high school graduates were more likely to have worked than was the case for dropouts. Turning to hours worked while in school, Table 1 shows no evidence that, on average, more hours are associated with a lower incidence of completing high school. This just serves to highlight the likely important effect of selectivity in the joint determination

of hours worked while in school and high school completion (more on that below).

Figures 1 and 2 show the distribution of hours worked while in school by gender. Note that this is the "conditional on positives" distribution. Two features are apparent in these pictures. The first one is the fact that the distributions tend to have long upper tails. Additionally, the distributions very often do not exhibit a unique mode. This is particularly true for women. Indeed, Figure 2 is quite striking in that a substantially higher fraction of women dropouts worked about 40 hours a week in the twelve months preceding the date they left school compared to men. In general, the graph for the women who eventually dropped out exhibits peaks at twenty and forty hours of work (even thirty in Ontario).

Finally, Figures 3 and 4 graph the relationship between high school completion rates and hours worked. Looking at these pictures, one is not surprised to find that the raw correlation between the incidence of having a job and graduating from high school is positive, especially in the case of women. In fact, only those who work at least 36 hours per week have a lower rate of high school completion than those not working at all, whereas for men the high school completion rate at zero hours of work is about the same as that measured at 16-20 hours per week. The visual impression left by Figures 3 and 4 is that either working a small to moderate number of hours is actually beneficial to students or there are strong selectivity effects. To provide preliminary evidence of the extent of the latter, Table 2 shows the relationship between school performance, as measured by the incidence of having failed in primary school and by the self-reported grades, and the number of hours worked. Looking at just the fraction of respondents who report an average grade of A, it would seem unlikely that simply going from zero hours of work to between one and five hours would actually improve school performance in a such a dramatic fashion. Instead, it appears likely that selectivity is affecting the cross-sectional correlation between work intensity and achievement. In terms of the relationship between hours worked and the incidence of having failed in elementary school, preliminary evidence would suggest that those working a relatively large number of hours while they are in school tend to have a prior history of experiencing problems in school, although the percentages do bounce around somewhat. At least in the case of those working more than 40 hours a week, both males or females exhibit very poor current performance in secondary school and a majority failed at least once while in primary school.[4]

[4]The questions for grades and for having failed in elementary school were "What was your average in the last full term before you left elementary/secondary school?", and "Did you ever fail a grade in elementary school?"

# 3 Modelling the Joint Decision to Graduate and to Work While in School.

## 3.1 Both Outcomes Modelled as Joint Binary Variables

To model both the decision to complete high school and the decision to work in the twelve months preceding the end of going full-time to school, one can use a latent index framework such as the bivariate probit (see, e.g., Heckman (1978)). This model allows for the error terms of both choice equations to be correlated, as would be expected if some unobserved factors which influence the decision to drop out also influence the decision to work. Assuming we have a variable $z_i$ whose effect on the outcome of interest is only through its effect on treatment status, let the system be represented as

$$y_i^* = x_i\beta + \delta d_i + \nu_i \tag{1}$$

$$y_i = 1(x_i\beta + \delta d_i + \nu_i > 0)$$

$$d_i^* = z_i\gamma + x_i\Gamma + \eta_i \tag{2}$$

$$d_i = 1(z_i\gamma + x_i\Gamma + \eta_i > 0)$$

where $y_i$ denotes completion of high school, $d_i$ is a dummy for work while in school, $x_i$ and $z_i$ are exogenous variables and $(\nu_i,\ \eta_i)$ follow a bivariate normal distribution $N(0,0,1,1,\rho)$ where $\rho$ is the correlation coefficient between $\nu$ and $\eta$. The exclusion restriction imposed is that measures of local labour market conditions affect the graduating decision only through its effect on working while in school.

## 3.2 Outcomes Modelled as a Mixture of Discrete/Limited-Dependent Variables

One can also directly make use of the number of hours worked reported by the individuals instead of dichotomizing it into a work/no work endogenous binary regressor. So the substantive question of whether high school students' educational attainment is affected by work while in school is refined somewhat by framing it in terms of the impact of an additional hour worked on the probability of completion.

If basically everyone worked, the evaluation problem would be relatively simple. In its simplest form, one could use a linear regression to study the effect of local labour market conditions on the number hours worked and then use the fitted values from that model to obtain a causal impact.

The complication here arises from the fact that not everyone works. Consequently, one must explicitly account for the corner solution at zero hours. To do that, I estimate a bivariate Probit/Tobit model building on the assumption of joint normality.

More specifically, let the latent propensity to complete high school and the number of hours worked be represented again as:

$$y_i^* = x_i\beta + \delta h_i + \nu_i \tag{3}$$

$$y_i = 1(x_i\beta + \delta h_i + \nu_i > 0) \tag{4}$$

$$h_i = max(0, z_i\gamma + x_i\Gamma + \eta) \tag{5}$$

where $h_i$ represent the number of hours worked, $x_i$ is the same vector of exogenous variables as in the previous model and $z_i$ is the same instrument, and the error terms $\nu$ and $\eta$ are again assumed to follow a bivariate normal $N(0, 0, 1, \sigma_\eta^2, \rho)$. In estimating equations (3) and (5), I again make use of the assumption that local labour market conditions affect the decision to complete high school only through their effect on the number of hours worked.[5]

As is well known, the standard tobit model relies on the assumption that the error term is normally distributed. It also assumes homoscedasticity. However, recent work by Kenneth Chay and Bo Honoré (Chay and Honoré (1998)) in an application focusing on the effect of Civil Rights Legislation on the economic status of African-Americans has shown that departures from normality can lead to large biases in the maximum likelihood estimates. More specifically, Chay and Honoré find that long tailed distributions are a particular source of biases.

As we saw in the previous section, the distribution of hours worked by high school students does show a substantial departure from normality. It would therefore appear to be appropriate to relax the assumption of normality by using a semiparametric estimator to model the number of hours worked in the first stage of the estimation. For example, one could use either the censored least absolute deviation (CLAD) model (Powell (1984)) or the symmetrically censored least squares estimator (SCLS) (Powell (1986)). However, provided one is interested in the impact of actual (as opposed to desired or latent) hours, the corner solution at zero hours actually precludes recovering the parameter of interest by a "plug-in" approach similar to two-stage least squares. Readers are referred to Appendix B for further details.

[5] See Appendix A for a full derivation of the likelihood function.

# 4 Results.

The results for the effect of having a job on the probability of completing high school are reported in Table 3 for the bivariate probit model and, for comparison purposes, in Table 4 for two-stage least squares. As shown in column (1) of Table 3, ignoring the endogeneity of having a job and simply using a Probit would lead us to conclude at the absence of any negative effects on the probability of completing high school. This, of course, is simply the conditional-on-observables version of what we saw in the descriptive statistics. Indeed, the coefficient associated to having a job is not only positive but it is also statistically significant for women.

The reduced form results for men shown in column 3 show that, perhaps not surprisingly, work incidence is procyclical, as is the case for women (Panel B, column 3). Interestingly, when using the expanded set of instruments, we can see that the procyclicality of work incidence is much weaker for people who went to private school. This is suggestive that students from more favourable backgrounds are less likely to be on the lookout for jobs while they are in school. In addition, once the unemployment rate is interacted with the private school dummy, the main effect coefficient associated with having attended a private school becomes very large in absolute value. Looking either at the bivariate probit or the two-stage least squares estimates, we can see that the effect of working while in school on the probability of graduating is large and negative for men while the evidence is largely inconclusive in the case of women. In fact, if I use only one measure of labour market tightness instead of two, it makes very little difference for men (besides precision) while for women the impact becomes significant if I use only the unemployment rate in the Census Metropolitan Area. However, as we can see in Panel B of Table 4, the hypothesis that the exclusion restrictions are valid is rejected, which casts doubts on the interpretation that the results obtained when using only the CMA measure represent the causal effect of working while in school. In other words, part of the variation in high school graduation can be explained by the instruments independently of their effect on work incidence. For males, however, the results in Panel A of Table 4 show little evidence that the exclusion restrictions are invalid.[6] It would appear then that the joint process governing the decision to graduate from high school and the decision to work while in school is of a different nature for females compared to males. Also, the estimated positive correlation coefficient strongly suggests that whatever unobservable factor tends to make individuals more likely to work makes them more likely to complete high school as well. This is especially true in the case of men. Such a correlation provides support to the notion that the positive relationship between hours worked and graduation incidence over a fairly large range of hours worked shown in

[6]The idea of including these specific interactions is meant to capture the impact of "family background" type variables on the propensity to work. For example, if part of the reason someone is holding a job while in school is simply to have some pocket money, then we would expect that those who went to a private secondary school would come from more economically favourable backgrounds where such a motive might not be as important.

Figures 3 and 4 is driven in part by selectivity.

Table 5 reports estimates of the impact of an additional hour of work on the probability of graduation, using again the same exclusion restrictions. As before, all estimates are marginal effects.[7] The bivariate probit/tobit model results suggest again that working more hours decreases the probability that men will complete high school. Perhaps surprisingly, given the results in Table 3, this is also true for women. One potential reason for the apparent contradiction may lie in the well-known greater sensitivity of the tobit model to deviations from the assumed homoscedasticity of the residual compared to the probit model. To check this I ran a modified version of the model allowing for multiplicative heteroscedasticity (with the same regressors). Although the hypothesis that errors are homoscedastic is easily rejected, the impact of hours on the graduation probability is still significant for females although the coefficient decreases in absolute value by about 20% while it is virtually left unchanged for men.[8]

### 4.1 Non-Linear Impacts

Although the estimates for men presented so far are strongly suggestive of a negative impact of work while in school, the assumed linearity masks potentially important differences in the marginal effect of hours worked at different parts of the hours distribution. As shown in Figures 3 and 4, the cross-sectional relationship between hours worked and graduation incidence exhibits an inverted U-shape. While this relationship does not have any causal interpretation, it still suggests that allowing for nonlinearities would be desirable. Furthermore, as pointed out above, the tobit results are subject to potentially important biases stemming from a significant departure from normality of the hours distribution, as shown by Chay and Honoré (1998) in another application.

To allow for nonlinear marginal effects of hours worked. I use a variant of the probit-tobit model by using a joint bivariate probit/ordered probit model in which hours worked are coded in intervals (e.g. 0, between 1 and 14, 15 or more), with zero hours being the left-out category. To finesse the issue of having to arbitrarily choose the cutoff points, I estimate the model with different cutoffs. The results are reported in Table 6 along with coefficient estimates from a standard probit.

The first thing to note again is that the cross-sectional relationship between hours worked and the probability of graduating never shows much evidence of a negative impact. In fact, once I allow for non linear effects, there is even evidence of a statistically significant positive impact of a moderate number of hours on the completion probability. Looking at the estimates in Table 6, it would appear as though the overall negative impact measured previously is driven by variations in hours worked observed above at least ten hours per

[7] Note that the marginal effect of the instruments represent the impact on the expectation of the observed hours, $E(hours \mid X)$, not the direct tobit coefficient.

[8] Results are available upon request.

week. Secondly, the higher is the threshold, the larger is the estimated impact of working a number of hours above it. This is true for both men and women. Again, the results for women contrast somewhat with those obtained with the bivariate probit. In fact, the higher is the threshold for women, the larger is the negative impact of working a number of hours *below* the threshold. Notwithstanding the fact that, as shown in Panel B of Table 4, the exclusion restrictions fail the overidentifying test, one important impact of modelling using a bivariate normal distribution is that it allows the estimation of the correlation between unobservable components driving both outcomes. Perhaps not surprisingly, the larger is the estimated correlation coefficient, the more negative the marginal impact of hours becomes. But then the estimated impact of hours becomes increasingly driven by the assumed functional form.

As a check on the validity of these results, I use a standard two-stage least squares approach to model the endogenous dummies for hours worked below and above each specified thresholds in Table 6. Results are reported in Table 7. The 2sls results for men are generally in agreement with those obtained with the nonlinear model. This is particularly true in the case of the dummy variable for working more than the specified threshold. In fact, the 2sls results are informative about the source of identification in the nonlinear model in that, given the virtual absence of any explanatory power of the exclusion restrictions for the "low hours" dummy, it would appear that the distributional assumption is driving the results in Table 6 for the effect of working a relatively modest number of hours. This is true for both men and women.

In summary, in the case of men, excluding local labour market conditions from the graduation outcome reverses what simple descriptive statistics would lead us to conclude: working does seem to have the causal effect of making young Canadian students drop out of high school. Interestingly, although Cameron and Heckman (1994) show that young people in the United States (using the NLSY) exhibit some sensitivity to an alternative measure of local labour market conditions, recent attempts by Ruhm (1997) and Oettinger (1999) at trying to use the local rate of unemployment as an instrument for work while in school to explain either educational attainment or high school performance have failed in that the instrument appears to be very weak throughout the hours distribution, contrary to the case here.

# 5 Conclusion

In this paper I find that male high school students in Canada are sensitive to the state of the local labour market and that the jobs they take up while they are still in school cause a significant decrease in their graduation probability. This is in contrast to much of the evidence in the United States. It thus provides a partial explanation as to why the high

school dropout rate in Canada has always been higher than in the U.S.[9]

That being said, it must be noted that this mechanism is identified only for people who were induced to work a relatively large number of hours. For those working a modest number of hours per week, the instruments are not powerful enough to explain much of the variation. Thus, this paper cannot answer the question of whether working a moderate number of hours has a negative (or, for that matter, positive) causal impact on the graduation probability. Conditional on the observables, there is little evidence that it does, unless one is willing to rely exclusively on the identification provided by the assumption of joint normality governing both processes. For females, the results are largely inconclusive in part because the exclusion restrictions' validity is doubtful.

In light of the evidence presented in this paper, one may be left to wonder why canadian young men are more sensitive to local labour market conditions as a channel leading to not completing high school than are Americans. A possible explanation worth investigating may be that basically all wage differentials are smaller in Canada, including the wage premium to holding a high school degree. In fact, although not reported here, computation of the average wage gap for full-time workers aged 16 to 24 between those with just a high school diploma and those without one using the 1996 Canadian Census shows that there is fundamentally no difference. Such is not the case in the U.S. (Krueger (1997)). Consequently, it may not be surprising that Canadians may display a stronger tendency to be "on the lookout" for jobs that would serve as a vehicle for a more or less permanent transition to the labour force before graduating from high school. Naturally, these comparisons of mean wages may simply mask a different selection process in the two countries which could affect the relative quality of the pool of workers without a high school diploma.

Finally, it is not clear from a social welfare standpoint whether a zero high school drop out rate is necessarily desirable: students who lack either the talent or the motivation may be better off leaving school early even if it implies facing rather mediocre job market prospects. In fact, as can be seen in Table 2 when one looks at the relationship between school performance and the number of hours worked, it does appear to be the case that students who are struggling in school (and, perhaps more importantly, have a history of prior difficulties in elementary school), are the ones most likely to be driven out of school by job opportunities. Thus whether work while in school is found to decrease the probability of finishing high school, it is not clear that, as a matter of policy, restricting the ability of high school students to work would be welfare improving. It is also suggestive that earlier interventions in elementary schools might well be the most effective way of dealing with leaving high school before completion.

[9]Even if the institutional environment is not quite the same in both countries with, e.g, Québec requiring only 11 years of schooling to get a high school diploma, the historical differences in the dropout rates of the two countries have been substantial enough that differences in institutions cannot really have been a major contributor. In any case, the difference between U.S. and Canadian high school completion rates has historically been substantial even when excluding Québec.

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## Appendix A

Let the bivariate normal density function be expressed as:

$$f(\nu_i, \eta_i) = \frac{1}{2\pi\sqrt{1-\rho^2}\sigma_\eta} \exp\left[-\frac{1}{2\left(1-\rho^2\right)}\left(v_i^2 - 2\rho v_i \frac{\eta_i}{\sigma_\eta} + \frac{\eta_i^2}{\sigma_\eta^2}\right)\right] \tag{6}$$

Each individual's contribution to the likelihood function can be expressed by examining all possible cases, where $y_i$ denotes high school completion and $H_i$: represents the hours worked by individual i:

$$P\left(y_i = 1, h_i > 0\right) = \int_{-x_i\beta-\delta h_i}^{\infty} f\left(v_i, \eta_i\right) dv_i \tag{7}$$

Standardizing the bivariate normal density function:

$$P\left(y_i = 1, h_i > 0\right) = \int_{-x_i\beta-\delta h_i}^{\infty} \frac{1}{\sigma_\eta}\phi_2\left(v_i, \eta_i^*\right) dv_i, \tag{8}$$

where $\phi_2$ corresponds to the standardized density and $\eta_i^* = \frac{h_i - z_i\gamma - x_i\Gamma}{\sigma_\eta}$.
In similar fashion:

$$P\left(y_i = 0,\, h_i > 0\right) = \int_{-\infty}^{-x_i\beta-\delta h_i} \frac{1}{\sigma_\eta}\phi_2\left(v_i, \eta_i^*\right) dv_i. \tag{9}$$

The last two cases are:

$$P\left(y_i = 1,\, h_i = 0\right) = \int_{-x_i\beta}^{\infty} \int_{-\infty}^{\frac{-z_i\gamma - x_i\Gamma}{\sigma_\eta}} \phi_2\left(v_i, \eta_i^*\right) dv_i d\eta_i^*, \tag{10}$$

and

$$P\left(y_i = 0,\, h_i = 0\right) = \int_{-\infty}^{-x_i\beta} \int_{-\infty}^{\frac{-z_i\gamma - x_i\Gamma}{\sigma_\eta}} \phi_2\left(v_i, \eta_i^*\right) dv_i d\eta_i^* = \Phi_2\left(-x_i\beta, \frac{z_i\gamma + x_i\Gamma}{\sigma_\eta}\right), \tag{11}$$

where $\Phi_2$ corresponds to the standardized cumulative bivariate distribution.

Letting $n_j$ $(j = 1, 4)$ represent the number of observations in each subsample corresponding to the cases just described, we obtain the following log-likelihood function which is maximized with respect to the parameters $\beta, \Gamma, \delta, \gamma, \sigma_\eta$ and $\rho$ :

$$\log L = \sum_i^{n_1} \log \int_{-x_i\beta-\delta h_i}^{\infty} \frac{1}{\sigma_\eta}\phi_2\left(v_i, \eta_i^*\right) dv_i + \sum_i^{n_2} \log \int_{-\infty}^{-x_i\beta-\delta h_i} \frac{1}{\sigma_\eta}\phi_2\left(v_i, \eta_i^*\right) dv_i \tag{12}$$

$$+ \sum_i^{n_3} \log \int_{-x_i\beta}^{\infty} \int_{-\infty}^{\frac{-z_i\gamma - x_i\Gamma}{\sigma_\eta}} \phi_2\left(v_i, \eta_i^*\right) dv_i d\eta_i^* + \sum_i^{n_4} \log \Phi_2\left(-x_i\beta, \frac{z_i\gamma + x_i\Gamma}{\sigma_\eta}\right)$$

# Appendix B

This appendix outlines why implementing a two-stage estimation procedure similar to two-stage least squares in linear models does not identify the parameter of interest when hours of work have a mass point at zero.

To see this, let $\widehat{h_i}$ be the predicted hours of work from a first-stage regression. Then we have

$$\widehat{h_i} = z_i\widehat{\gamma} + x_i\widehat{\Gamma} \tag{13}$$

From the outcome equation we get

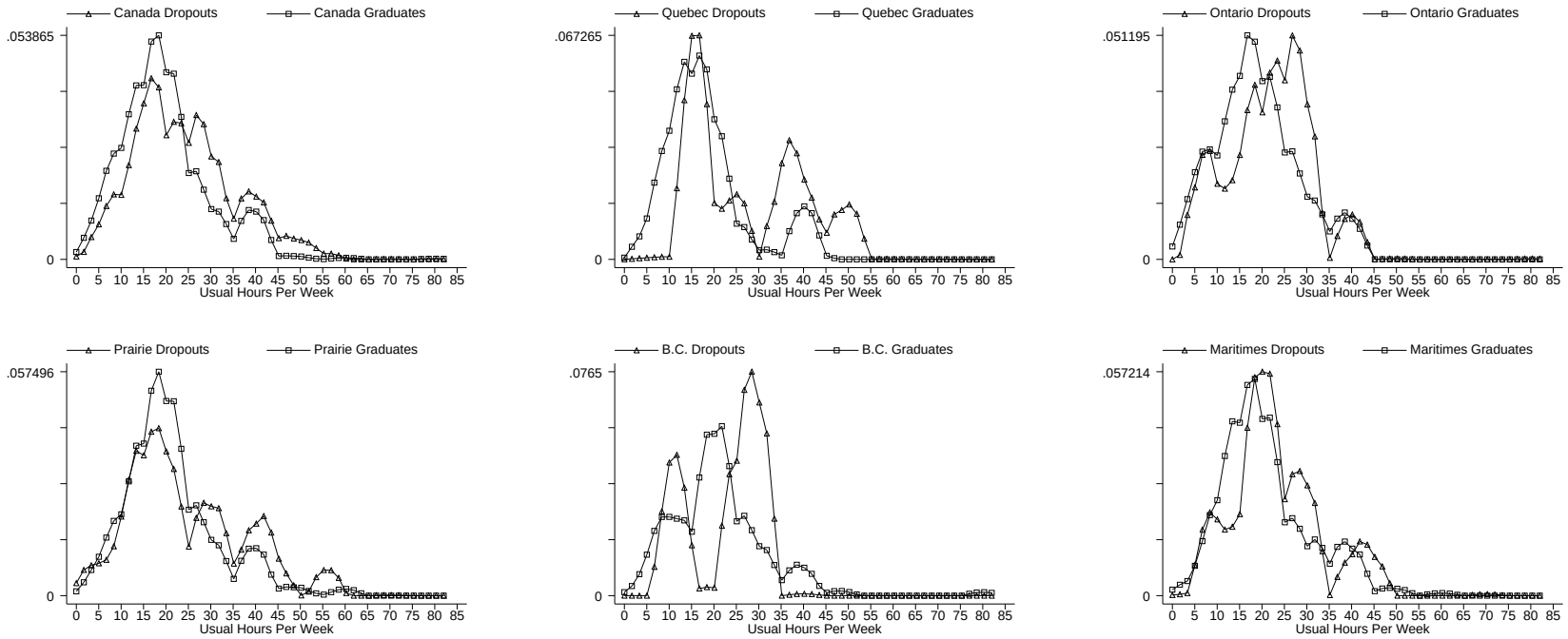
$$\begin{aligned} y_i &= 1(x_i\beta + \delta\widehat{h_i} + \delta(h_i - \widehat{h_i}) + v_i > 0) \qquad (14) \\ &= 1(x_i\beta + \delta\widehat{h_i} + \widehat{u_i} > 0) \end{aligned}$$

where

$$\begin{aligned} \widehat{u_i} &= \delta(h_i - \widehat{h_i}) + v_i \qquad (15) \\ &= \delta(max(0, z_i\gamma + x_i\Gamma + \eta_i) - z_i\widehat{\gamma} - x_i\widehat{\Gamma}) + v_i \qquad (16) \end{aligned}$$

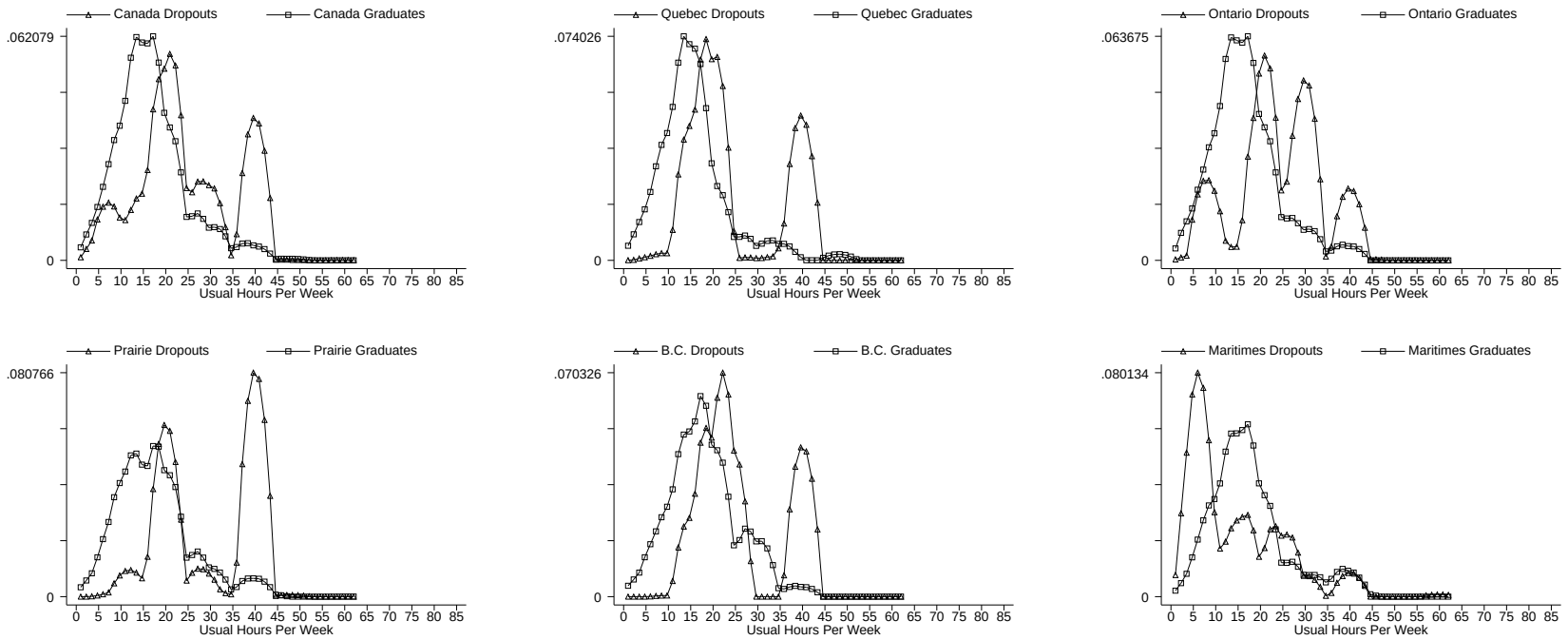
Looking at equation (16), one can see that due to the corner solution at zero hours worked, $x_i$ will in general be correlated with $\widehat{u_i}$ even if the estimated parameters are replaced with their probability limits. Consequently, I cannot consistently estimate the effect of actual hours worked on the probability of graduating.

However, a two-step approach could still be used to consistently estimate the effect of *desired* hours of work $h_i^*$ . To see this, note that if we replace $h_i$ by $h_i^*$ in equation (3) and apply the same derivation as the one shown in equations (14) to (16) and replace the estimated parameters with their probability limits, then we would get a residual with the usual desirable properties. This would represent a significant change in the interpretation of the resulting parameter and it would not be directly comparable to the estimates obtained when modelling hours of work either as a Tobit or as an ordered probit.




Source: School Leavers Survey

Figure 1. Distribution of Hours Worked While in School-Men




Source: School Leavers Survey

Figure 2. Distribution of Hours Worked While in School-Women

Figure 3. Male High School Completion Rates by Hours Worked

Source: 1991 School Leavers Survey and 1995 Follow−Up

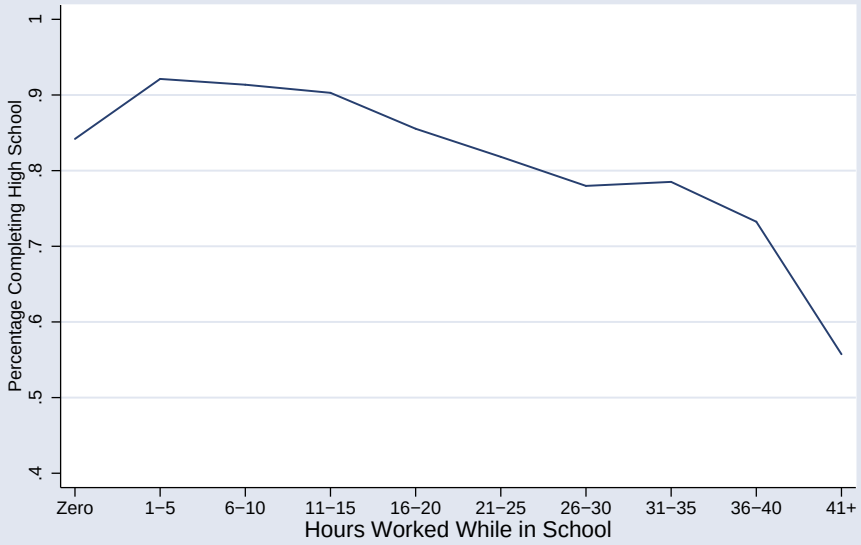



Figure 4. Female High School Completion Rates by Hours Worked

Source: 1991 School Leavers Survey and 1995 Follow−Up

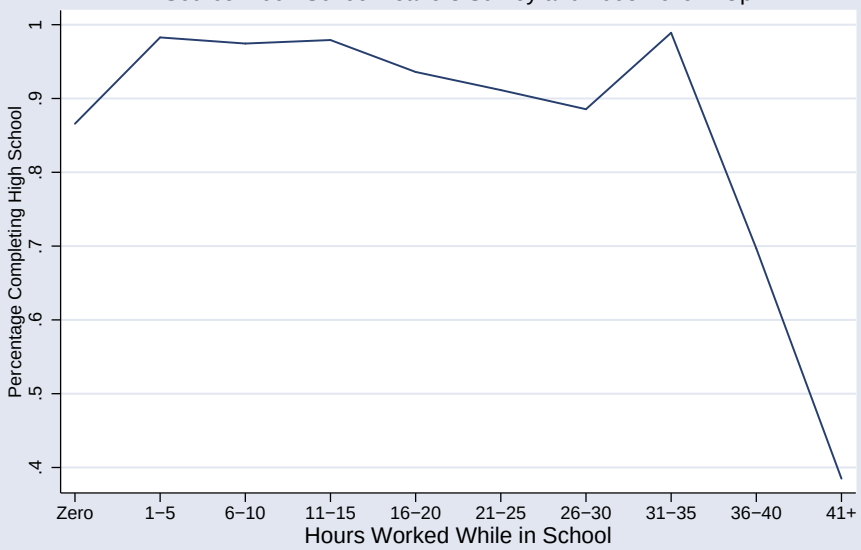


Table 1. Mean Sample Statistics: School Leavers' Survey and Follow-up

| Variable | H.S. Dropouts with no Post-second. Educ. | H.S. Dropouts with Some Post-sec. Educ. | High School Graduates | H.S. Graduates with Some Post-sec. Educ. | B.A Degree Or More |
|---|---|---|---|---|---|
| Father went to Coll/Uinv. | 3,10% | 13,00% | 7,99% | 16,00% | 37,81% |
| Mother Went to Coll/Univ. | 1,77% | 7,16% | 8,41% | 11,72% | 27,15% |
| % Males | 61,71% | 71,99% | 56,25% | 50,48% | 36,69% |
| GPA of A in H.S. | 3,22% | 2,12% | 12,06% | 21,08% | 58,20% |
| GPA of B in H.S. | 29,05% | 33,36% | 42,58% | 49,00% | 38,48% |
| GPA of C in H.S. | 53,41% | 57,52% | 40,77% | 28,31% | 3,32% |
| GPA of D in H.S. | 14,31% | 7,00% | 4,59% | 1,60% | 0,00% |
| Failed in Primary School | 40,11% | 29,16% | 21,18% | 11,60% | 0,36% |
| Collected UI in Last 12 Months* | 22,75% | 20,98% | 19,42% | 17,27% | 12,55% |
| Collected Welfare in Last 12 Months* | 20,79% | 16,19% | 12,48% | 6,45% | 1,30% |
| With a Child | 43,47% | 23,22% | 22,32% | 12,10% | 2,85% |
| Hours Worked While in School | 13,01 | 15,19 | 13,63 | 11,98 | 8,97 |
| Had a Job While in H.S. | 55,17% | 62,78% | 65,56% | 66,88% | 60,82% |
| N | 1080 | 298 | 970 | 2177 | 843 |

Note. *Refers to the twelve months prior to the 1995 Follow-up, not the initial 1991 interview.

Table 2. Grades and Hours Worked While In School

| | Fraction of respondents reporting an average grade of | | | | Fraction of respondents who failed in primary school |
|---|---|---|---|---|---|
| | A | B | C | D | |
| **Panel A: Men** | | | | | |
| **Hours Worked** | | | | | |
| Zero | 0.233 | 0.378 | 0.345 | 0.044 | 0.196 |
| 1-5 | 0.394 | 0.530 | 0.076 | 0.000 | 0.171 |
| 6-10 | 0.241 | 0.450 | 0.270 | 0.039 | 0.227 |
| 11-15 | 0.235 | 0.430 | 0.306 | 0.029 | 0.169 |
| 16-20 | 0.191 | 0.416 | 0.346 | 0.047 | 0.164 |
| 21-25 | 0.128 | 0.402 | 0.387 | 0.083 | 0.221 |
| 26-30 | 0.045 | 0.371 | 0.536 | 0.048 | 0.189 |
| 31-35 | 0.214 | 0.387 | 0.399 | 0.000 | 0.245 |
| 36-40 | 0.182 | 0.372 | 0.378 | 0.068 | 0.270 |
| 41+ | 0.026 | 0.287 | 0.601 | 0.086 | 0.424 |
| **Panel B; Women** | | | | | |
| **Hours Worked** | | | | | |
| Zero | 0.288 | 0.439 | 0.255 | 0.018 | 0.106 |
| 1-5 | 0.507 | 0.333 | 0.160 | 0.000 | 0.141 |
| 6-10 | 0.334 | 0.478 | 0.181 | 0.008 | 0.044 |
| 11-15 | 0.306 | 0.506 | 0.173 | 0.015 | 0.046 |
| 16-20 | 0.283 | 0.471 | 0.238 | 0.008 | 0.047 |
| 21-25 | 0.197 | 0.543 | 0.229 | 0.031 | 0.106 |
| 26-30 | 0.145 | 0.537 | 0.309 | 0.009 | 0.189 |
| 31-35 | 0.286 | 0.537 | 0.165 | 0.012 | 0.300 |
| 36-40 | 0.170 | 0.446 | 0.315 | 0.069 | 0.072 |
| 41+ | 0.054 | 0.219 | 0.144 | 0.582 | 0.585 |

Source: School Leavers Survey

Table 3. Impact of Having a Job While in School on Graduation
Robust Standard Errors in Parentheses

A. MEN

| | Cross-Sectional Probit | Bivariate Probit | | | |
|---|---|---|---|---|---|
| | [1] | [2] | [3] | [4] | [5] |
| Dependent Variable: | H.S. Graduation | H.S. Graduation | Job While in H.S. | H.S. Graduation | Job While in H.S. |
| Had A Job | 0.0029 | -0.3241 | | -0.3075 | |
| | (0.0177) | (0.0836) | | (0.0862) | |
| Local Unemployment Rate | - | - | -0.0245 | - | -0.0252 |
| | | | (0.0067) | | (0.0071) |
| Provincial Unemployment Rate | - | - | -0.0187 | - | -0.0184 |
| Of 25-44 Year-Olds. | | | (0.0057) | | (0.0058) |
| Local U.Rate X Private School | | | - | | 0.0693 |
| | | | | | (0.0165) |
| Local U. Rate X With A Child | | | - | | -0.0258 |
| | | | | | (0.0099) |
| Father Went to Coll/Univ. | 0.0378 | 0.0424 | -0.0422 | 0.0434 | -0.0422 |
| | (0.0250) | (0.0413) | (0.0305) | (0.0412) | (0.0295) |
| Mother Went to Coll/Univ. | 0.0484 | 0.0631 | 0.0073 | 0.0626 | -0.0006 |
| | (0.0279) | (0.0509) | (0.0333) | (0.0511) | (0.0324) |
| Difficulty in Maths. | 0.0225 | 0.0393 | 0.0395 | 0.0393 | 0.0461 |
| | (0.0171) | (0.0248) | (0.0559) | (0.0249) | (0.0221) |
| Difficulty in Lang. | -0.0050 | 0.0001 | 0.0178 | -0.0001 | 0.0187 |
| | (0.0187) | (0.0259) | (0.0245) | (0.0257) | (0.0242) |
| Went to Private School | 0.0010 | -0.0462 | -0.1245 | -0.0367 | -0.7494 |
| | (0.0369) | (0.0512) | (0.0398) | (0.0511) | (0.1561) |
| GPA of A in H.S. | 0.1975 | 0.4549 | -0.0395 | 0.4621 | -0.0292 |
| | (0.0203) | (0.0645) | (0.0559) | (0.0630) | (0.0552) |
| GPA of B in H.S. | 0.1891 | 0.2622 | 0.0001 | 0.2649 | 0.0052 |
| | (0.0308) | (0.0533) | (0.0525) | (0.0526) | (0.0518) |
| GPA of C in H.S. | 0.0987 | 0.1333 | -0.0207 | 0.1345 | -0.0172 |
| | (0.0258) | (0.0505) | (0.0518) | (0.0499) | (0.0512) |
| Failed in Primary School | -0.0933 | -0.1009 | -0.0074 | -0.1020 | -0.0064 |
| | (0.0268) | (0.0272) | (0.0245) | (0.0270) | (0.0268) |
| With a Child | -0.1638 | -0.1378 | 0.0060 | -0.1399 | 0.2332 |
| | (0.0433) | (0.0363) | (0.0331) | (0.0360) | (0.0971) |
| Regional Dummies-Yes | | | | | |
| Correlation Coefficient | | 0.8001 | | 0.7735 | |
| Between Error Terms | | (0.1239) | | (0.1357) | |
| N=2576 | | | | | |

Table 3 (continued)

B. WOMEN

| | Cross-Sectional Probit | Bivariate Probit | | | |
|---|---|---|---|---|---|
| | [1] | [2] | [3] | [4] | [5] |
| Dependent Variable: | H.S. Graduation | H.S. Graduation | Job While in H.S. | H.S. Graduation | Job While in H.S. |
| Had A Job | 0.0277 | -0.1517 | | -0.1660 | |
| | (0.0115) | (0.1795) | | (0.1483) | |
| Local Unemployment Rate | - | - | -0.0263 | - | -0.0248 |
| | | | (0.0063) | | (0.0061) |
| Provincial Unemployment Rate | - | - | -0.0076 | - | -0.0068 |
| Of 25-44 Year-Olds. | | | (0.0085) | | (0.0078) |
| Local U. Rate X With A Child | | | - | | 0.0215 |
| | | | | | (0.0111) |
| Local U.Rate X Private School | | | - | | -0.0083 |
| | | | | | (0.0052) |
| Father Went to Coll/Univ. | 0.0257 | 0.0593 | -0.0281 | 0.0600 | -0.0246 |
| | (0.0098) | (0.0330) | (0.0193) | (0.0334) | (0.0195) |
| Mother Went to Coll/Univ. | 0.0410 | 0.1540 | -0.0157 | 0.1551 | -0.0186 |
| | (0.0070) | (0.0391) | (0.0213) | (0.0378) | (0.0217) |
| Difficulty in Maths. | 0.0027 | 0.0192 | 0.0717 | 0.0203 | 0.0735 |
| | (0.0094) | (0.0210) | (0.0142) | (0.0207) | (0.0145) |
| Difficulty in Lang. | 0.0025 | 0.0078 | 0.0219 | 0.0079 | 0.0224 |
| | (0.0104) | (0.0233) | (0.0186) | (0.0237) | (0.0192) |
| Went to Private School | -0.0001 | 0.0063 | 0.0422 | 0.0084 | -0.1620 |
| | (0.0162) | (0.0361) | (0.0238) | (0.0366) | (0.1116) |
| GPA of A in H.S. | 0.0715 | 0.2044 | 0.0387 | 0.2074 | 0.0363 |
| | (0.0159) | (0.0605) | (0.0461) | (0.0558) | (0.0475) |
| GPA of B in H.S. | 0.0545 | 0.1085 | 0.0308 | 0.1095 | 0.0293 |
| | (0.0213) | (0.0393) | (0.0445) | (0.0388) | (0.0459) |
| GPA of C in H.S. | 0.0224 | 0.0496 | 0.0042 | 0.0495 | 0.0030 |
| | (0.0131) | (0.0357) | (0.0444) | (0.0364) | (0.0458) |
| Failed in Primary School | -0.0443 | -0.0723 | -0.0617 | -0.0732 | -0.0648 |
| | (0.0210) | (0.0329) | (0.0260) | (0.0316) | (0.0266) |
| With a Child | -0.1122 | -0.1431 | -0.0658 | -0.1454 | 0.0099 |
| | (0.0260) | (0.0405) | (0.0167) | (0.0351) | (0.0559) |
| Regional Dummies-Yes | | | | | |
| Correlation Coefficient | | 0.7531 | | 0.7748 | |
| Between Error Terms | | (0.5978) | | (0.2565) | |
| N=2792 | | | | | |

Note. Estimated parameters represent marginal effects evaluated at the mean of the regressors. Standard errors are computed using the delta method.

Table 4. Impact of Having a Job While in School on Graduation
Robust Standard Errors in Parentheses

A. MEN

| | Two-Stage Least Squares | | | |
|---|---|---|---|---|
| | [1] | [2] | [3] | [4] |
| Dependent Variable: | H.S. Graduation | Job While in H.S. | H.S. Graduation | Job While in H.S. |
| Had A Job | -0.5952 | | -0.4461 | |
| | (0.3020) | | (0.2057) | |
| Local Unemployment Rate | - | -0.0193 | - | -0.0203 |
| | | (0.0099) | | (0.0101) |
| Provincial Unemployment Rate | - | -0.0165 | - | -0.0161 |
| Of 25-44 Year-Olds. | | (0.0085) | | (0.0085) |
| Local U.Rate X Private School | | | | 0.0686 |
| | | | | (0.0271) |
| Local U. Rate X With A Child | | | | -0.0200 |
| | | | | (0.0123) |
| Overidentification Test Statistic | 0.0330 | | 1.4000 | |
| [p-value] | [0.8549] | | [0.7055] | |
| First-Stage F Statistic of Excluded Instruments | | 13.89 | | 11.83 |
| N=2576 | | | | |

B. WOMEN

| | Two-Stage Least Squares | | | |
|---|---|---|---|---|
| | [1] | [2] | [3] | [4] |
| Dependent Variable: | H.S. Graduation | Job While in H.S. | H.S. Graduation | Job While in H.S. |
| Had A Job | 0.0613 | | 0.0628 | |
| | (0.1918) | | (0.1931) | |
| Local Unemployment Rate | - | -0.0122 | - | -0.0116 |
| | | (0.0121) | | (0.0130) |
| Provincial Unemployment Rate | - | -0.0216 | - | -0.0214 |
| Of 25-44 Year-Olds. | | (0.0123) | | (0.0123) |
| Local U.Rate X Private School | | | | 0.0189 |
| | | | | (0.0245) |
| Local U. Rate X With A Child | | | | -0.0060 |
| | | | | (0.0117) |
| Overidentification Test Statistic | 8.462 | | 8.863 | |
| [p-value] | [0.0036] | | [0.0312] | |
| First-Stage F Statistic of Excluded Instruments | | 9.12 | | 5.09 |
| N=2792 | | | | |

Note. Other covariates are the same as those in Table 3.

Table 5. Impact of Hours of Work While in School On Graduation
Robust Standard Errors in Parentheses

| | MEN (N=2576) | | | WOMEN (N=2792) | | |
|---|---|---|---|---|---|---|
| | [1] | [2] | [3] | [4] | [5] | [6] |
| | **Cross-Sectional Probit** | **Bivariate Probit/Tobit** | | **Cross-Sectional Probit** | **Bivariate Probit/Tobit** | |
| | H.S. Graduation | H.S. Graduation | Hours Worked | H.S. Graduation | H.S. Graduation | Hours Worked |
| Variable | | | | | | |
| Hours Worked | -0.0012 | -0.0128 | - | 0.0002 | -0.0122 | - |
| | (0.0007) | (0.0030) | | (0.0005) | (0.0033) | |
| Local Unemployment Rate | | | -0.9890 | | - | -0.5267 |
| | | | (0.3723) | | | (0.2873) |
| Provincial Unemployment Rate | | | -0.6037 | | | -0.3394 |
| Of 25-44 Year-Olds. | | | (0.2596) | | | (0.2849) |
| Local U.Rate X Private School | | | -0.5243 | | | 0.8581 |
| | | | (0.4173) | | | (0.4863) |
| Local U. Rate X With A Child | | | 2.0628 | | | -0.3804 |
| | | | (0.7760) | | | (0.2787) |
| Correlation Coefficient | | 0.5848 | | | 0.7184 | |
| Between Error Terms | | (0.1334) | | | (0.1326) | |

Note. Other covariates are the same as in Table 3. The parameter for the impact of hours worked is the marginal probability effect evaluated at the mean of the regressors. The parameters for measuring the impact of local labour conditions represent the marginal impact of the unemployment rate measures on E(Observed Hours | X). Standard errors of the marginal effects are computed using the delta method.

Table 6. Non Linear Effects of Hours Worked
Robust Standard Errors in Parentheses

**Joint Probit for High School Graduation/Ordered Probit for Hours Worked**

Panel A. MEN

| | [1] | | [2] | [3] | | [4] | [5] | | [6] |
|---|---|---|---|---|---|---|---|---|---|
| | H.S. Graduation | | Hours Worked | H.S. Graduation | | Hours Worked | H.S. Graduation | | Hours Worked |
| Variable | | | | | | | | | |
| Less Than 10 Hours Per Week | -0.0492 | 0.0300 | - | - | | - | - | | - |
| | (0.0699) | (0.0340) | | | | | | | |
| At Least 10 Hours Per Week | -0.2861 | 0.0009 | - | - | | - | - | | - |
| | (0.0837) | (0.0177) | | | | | | | |
| Less Than 15 Hours Per Week | - | | - | -0.0920 | 0.0415 | - | - | | - |
| | | | | (0.0514) | (0.0215) | | | | |
| At Least 15 Hours Per Week | - | | - | -0.4010 | -0.058 | - | - | | - |
| | | | | (0.0653) | (0.0180) | | | | |
| Less Than 20 Hours Per Week | - | | - | - | | - | -0.1971 | 0.0262 | - |
| | | | | | | | (0.0362) | (0.0196) | |
| At Least 20 Hours Per Week | - | | - | - | | - | -0.5640 | -0.0122 | - |
| | | | | | | | (0.0476) | (0.0205) | |
| Local Unemployment Rate | - | | -0.0545 | - | | -0.0812 | - | | -0.0774 |
| | | | (0.0531) | | | (0.0336) | | | (0.0219) |
| Provincial Unemployment Rate | - | | -0.0419 | - | | -0.0482 | - | | -0.0505 |
| Of 25-44 Year-Olds. | | | (0.0364) | | | (0.0222) | | | (0.0145) |
| Local U.Rate X Private School | | | 0.1427 | | | 0.1321 | | | 0.1291 |
| | | | (0.1167) | | | (0.0654) | | | (0.0476) |
| Local U. Rate X With A Child | | | -0.0548 | | | -0.0384 | | | -0.0434 |
| | | | (0.0666) | | | (0.0414) | | | (0.0275) |
| Correlation Coefficient | 0.6996 | | | 0.8139 | | | 0.9025 | | |
| | (0.2099) | | | (0.1488) | | | (0.0905) | | |
| N=2576 | | | | | | | | | |

Table 6 (continued)

Panel B. WOMEN

| | [1] | | [2] | [3] | | [4] | [5] | | [6] |
|---|---|---|---|---|---|---|---|---|---|
| | H.S. Graduation | | Hours Worked | H.S. Graduation | | Hours Worked | H.S. Graduation | | Hours Worked |
| Variable | | | | | | | | | |
| Less Than 10 Hours Per Week | -0.0971 | 0.0156 | - | - | | - | - | | - |
| | (0.0694) | (0.0138) | | | | | | | |
| At Least 10 Hours Per Week | -0.2505 | 0.0250 | - | - | | - | - | | - |
| | (0.0722) | (0.0109) | | | | | | | |
| Less Than 15 Hours Per Week | - | | - | -0.0760 | 0.0328 | - | - | | - |
| | | | | (0.0585) | (0.0076) | | | | |
| At Least 15 Hours Per Week | - | | - | -0.3319 | 0.0151 | - | - | | - |
| | | | | (0.0738) | (0.0093) | | | | |
| Less Than 20 Hours Per Week | - | | - | - | | - | -0.1602 | 0.0363 | - |
| | | | | | | | (0.0443) | (0.0096) | |
| At Least 20 Hours Per Week | - | | - | - | | - | -0.5293 | 0.0059 | - |
| | | | | | | | (0.0639) | (0.0052) | |
| Local Unemployment Rate | - | | -0.1093 | - | | -0.0739 | - | | -0.0277 |
| | | | (0.0325) | | | (0.0175) | | | (0.0131) |
| Provincial Unemployment Rate | - | | -0.0306 | - | | -0.0298 | - | | -0.0196 |
| Of 25-44 Year-Olds. | | | (0.0323) | | | (0.0173) | | | (0.0122) |
| Local U.Rate X Private School | | | 0.1244 | | | 0.0955 | | | 0.0243 |
| | | | (0.0584) | | | (0.0321) | | | (0.0243) |
| Local U. Rate X With A Child | | | -0.0645 | | | -0.0444 | | | -0.0376 |
| | | | (0.0285) | | | (0.0168) | | | (0.0125) |
| Correlation Coefficient | 0.8620 | | | 0.8877 | | | 0.9465 | | |
| | (0.1803) | | | (0.1513) | | | (0.1033) | | |
| N=2792 | | | | | | | | | |

Note. Other covariates are the same as those in Table 3. Estimated parameters represent marginal probability effects evaluated at the mean of the regressors. Standard errors are computed using the delta method. Coefficients in boxes are cross-sectional probit estimates.

Table 7. Non Linear Effects of Hours Worked
Robust Standard Errors in Parentheses

**Two-Stage Least Squares**

Dependent Variable: H.S. Graduation Dummy.

| | MEN (N=2576) | | | WOMEN (N=2792) | | |
|---|---|---|---|---|---|---|
| | [1] | [2] | [3] | [4] | [5] | [6] |
| Variable | | | | | | |
| Less Than 10 Hours Per Week | 1.1096 | - | - | -1.7601 | - | - |
| | (1.9291) | | | (1.6766) | | |
| At Least 10 Hours Per Week | -0.3877 | - | - | -0.4127 | - | - |
| | (0.2435) | | | (0.5074) | | |
| Less Than 15 Hours Per Week | - | 0.0599 | | - | -1.6540 | |
| | | (0.5300) | | | (1.7403) | |
| At Least 15 Hours Per Week | - | -0.4412 | | - | -0.6226 | |
| | | (0.1979) | | | (0.7603) | |
| Less Than 20 Hours Per Week | - | - | 0.0545 | - | - | -0.7246 |
| | | | (0.4978) | | | (0.5485) |
| At Least 20 Hours Per Week | - | - | -0.3917 | - | - | 0.1443 |
| | | | (0.1896) | | | (0.3285) |
| First-Stage F Statistic of Excluded Instruments (Below threshold dummy) | 0.49 | 2.51 | 2.03 | 3.96 | 4.53 | 2.95 |
| First-Stage F Statistic of Excluded Instruments (Above threshold dummy) | 12.22 | 12.17 | 16.75 | 9.12 | 14.37 | 8.03 |
| Overidentification Test Statistic | 0.514 | 0.496 | 0.505 | 1.579 | 1.163 | 1.207 |
| [p-value] | [0.7732] | [0.7803] | [0.7767] | [0.4541] | [0.5590] | [0.5470] |

Instruments: local unemployment rate, provincial unemployment rate of 25-44 year-olds, interaction of local u. rate with private school dummy and with having a child dummy.

Note. Other covariates are the same as those in Table 3.