

2001s-09

**Return to a High School Diploma  
and the Decision to Drop Out:  
New Evidence from Canada**

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**Série Scientifique**  
*Scientific Series*

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**CIRANO**  
Centre interuniversitaire de recherche  
en analyse des organisations

Montréal  
Février 2001

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# Return to a High School Diploma and the Decision to Drop Out: New Evidence from Canada\*

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## Résumé / Abstract

Cette étude se penche sur le processus de transition de l'école vers le marché du travail et l'examine dans le contexte de l'évolution dans la valeur de détenir un diplôme d'études secondaires depuis 1981. Les principaux résultats découlant de l'analyse des données de recensement nous indiquent que bien que les diplômés du secondaire aient conservé un avantage en terme de taux d'emploi par rapport aux sortants depuis 1981, l'avantage salarial est demeuré beaucoup plus faible qu'aux États-Unis et ce, pour tous les groupes d'âge. Quant aux données du Suivi de l'Enquête sur les sortants, elles nous indiquent qu'il n'y a pas de différence majeure dans le processus de transition vers le marché du travail entre les sortants et les diplômés, outre le fait que les diplômés aient une probabilité plus grande d'avoir occupé un emploi à temps complet. Ayant établi que la valeur d'un diplôme d'études secondaires est substantiellement plus faible au Canada qu'aux États-Unis, la seconde étape de l'étude montre que le fait de diplômé ou non s'avère très sensible aux conditions économiques locales. Ces conditions opèrent par le biais de la probabilité d'avoir occupé un emploi dans les douzes mois précédant la fin des études secondaires, soit comme diplômé, soit comme sortant.

*The objective of this paper is to analyze the process by which young Canadians decide to leave high school and to situate it in the context of the value of a high school diploma over the 1981-1998 period, conditional on not pursuing post-secondary education. Evidence from the 1981-96 Canadian Censuses, the 1998 Canadian Labour Force Survey, and the 1981-1998 March Current Population Surveys shows that the wage premium to holding just a high school diploma in Canada is substantially lower than in the United States over the whole sample period and for all age groups. Turning to Statistics Canada's School Leavers Survey and its Follow-up, it is shown that high school graduates' labour market outcomes are essentially no better than those of dropouts, except perhaps in terms of employment rates. Finally, having established that the labour market*

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I would like to thank Nathalie Viennot-Briot for providing excellent research assistance. Thanks also to David Card, Thomas Lemieux, Claude Montmarquette, Craig Riddell, and seminar participants at Berkeley and the 2000 Canadian Economics Association Meeting for helpful comments and suggestions. Very special thanks to the late Marcel Dagenais in part for the GAUSS programs used in this paper, but mostly for having been such an inspiration for generations of students and, above all, such a beautiful man. Financial support from Human Resources Development Canada is gratefully acknowledged.

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*value of holding just a high school diploma in Canada is rather low, I go back to the individuals' decision to leave school either as dropouts or graduates and find that they were very sensitive to the conditions of the local labour market. Those conditions affected their graduation decision through their impact on the probability of having a job in the twelve months preceding the date they left school either as graduates or as dropouts.*

**Mots Clés :** Abandon scolaire, conditions économiques locales, rendement d'un diplôme d'études secondaires

**Keywords:** High school non-completion, local labour market conditions, return to a high school diploma

# 1 Introduction

High school dropout rates have historically been higher in Canada than in the United States. Although the gap between the two countries has been partially closed in recent years, the dropout rate in Canada is still somewhat higher than in the U.S., at least for men, and especially so when we limit the comparison to the states that are neighbouring Canada. To perhaps gain some insight as to why this discrepancy in high school dropout rates has existed, it may then be useful to study the labour market outcomes of young Canadians in relation to their schooling level.

Thus, one of the main objectives in this paper is to examine the process of deciding whether to quit high school before graduation, in the context of the value of graduating from high school relative to dropping out *conditional on not pursuing the schooling process beyond high school*. The interest of focusing on that segment of the labour market made of individuals with relatively low levels of education is twofold: first, they make a sizeable proportion of the population, even among the young. Evidence from Statistics Canada's Follow-up to the School Leavers' Survey (SLS) indicates that about 30% of all individuals aged 22-24 in 1995 had at most a high school degree. Secondly, if the marginal value of completing high school (excluding the option value of eventually obtaining a university degree) is low, then we would expect individuals who, at the margin, have to decide between completing high school or not, to be particularly sensitive to labour market opportunities that present themselves while in school, which may in turn have an effect of the decision to drop out. To study the school-to-work process in the context of how the premium to a high school degree may have changed over time, I use data from the Canadian Censuses (1981, 86, 91 and 96) as well as the 1998 Labour Force Survey. For comparison purposes I also show the return to a high school diploma in the United States over the 1981-1998 period using the March Supplements to the Current Population Survey. In addition I exploit the School Leavers Survey to study the impact of work while in school on

the probability of graduation.

It is generally believed that individuals with low levels of schooling will have greater difficulties thriving in today's environment compared to what previous generations of low education individuals experienced, which should have the effect of inducing people to study beyond high school.<sup>1</sup> Yet the evidence shows that a fairly large proportion of the population does not complete high school (the high school non completion rate was estimated at around 18% for Canada in 1991 using the School Leavers' Survey). It may be that for those individuals who do not plan to go to university after high school, the value of finishing high school hinges on whether doing so brings large enough benefits and if, as the Canadian data show, those benefits appear to have been very low, then we may find ourselves with a situation in which we have both a relatively high dropout rate from high school *and* a large fraction of young people enrolling and completing university education. In other words, for high school dropouts, the margin at which schooling decisions are made is different from that of people who hesitate between stopping after high school graduation and going to university. If the university to high school premium increases while the high school completion to high school non-completion premium decreases, then the result may be that those who are hesitating between high school and university will be more likely to enroll in university while the others will be more likely to dropout, given that they heavily discount any potential benefit from a university education.

The main conclusion drawn from the Canadian data is that the wage premium to holding just a high school degree, has been substantially smaller than in the United States for all age groups. Given that holding just a high school diploma in Canada seems to provide little advantage in terms of wages,<sup>2</sup> I then take a step back to study the decision to complete high

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<sup>1</sup>Evidence in Canada (Beaudry and Green (1997)) shows that, in fact, recent cohorts of low education individuals have suffered real wage losses. However, this is true for *all* education categories.

<sup>2</sup>There is still some evidence of an advantage in terms of relative employment rates.

school for the subsample of individuals who do not pursue post-secondary education. We would expect those individuals to be particularly sensitive to labour market opportunities that present themselves while they are in school. Exploiting the fact that the School Leavers Survey data set includes hours worked in the twelve month period prior to leaving school either as a graduate or as a dropout, I estimate the impact that working while in school might have on the probability of graduation using local labour market conditions as an exogenous determinant of work activity. The results show that both men and women, but more particularly men, are very sensitive to job opportunities and that those job opportunities in turn lead to a sizeable reduction in the probability of graduating from high school. This contrasts with the simple raw correlation between work incidence or hours worked and graduation incidence, both of which are *positive*. In addition, results from an overidentification test suggest that while the exclusion restriction appears questionable for women, there is strong evidence that the instrument is valid for men.

The paper is structured as follows. First, some descriptive statistics on the rate of high school non-completion in both countries are presented, followed with data from the Canadian Censuses, the Labour Force Survey and the U.S. Current Population Survey showing the evolution over time of the wage premium of high school graduates compared to dropouts. Then I use the School Leavers Survey and its Follow-up to provide some additional evidence on the labour market performance of graduates relative to dropouts. The next section then examines how sensitive to labour market conditions are young students who have to decide between graduating from high school or not. Concluding remarks follow.

## 2 High School Non Completion Rates.

Figure 1 shows the high school non completion rate among individuals aged 20-21. Those numbers represent annual averages computed using the basic CPS monthly files and the LFS monthly files.<sup>3</sup> As we can see, the difference for men at the start of the decade was about 4%, roughly the same as in 1997 while it was smaller for women. Indeed women's dropout rates essentially converged over the nineties while the gap closed somewhat for men. However, once we compare Canada with the neighbouring U.S. states, we can see that even in the case of women there is still a higher fraction of Canadians not completing high school. For men the gap in 1997 was still about 5% compared with roughly 7% at the start of the decade.

Naturally, one difficulty in making comparisons of the high school dropout rate in Canada and the United States stems from the fact that while the twelve years of schooling criterion is uniformly applied in the U.S., it is not in Canada. The two largest canadian provinces, Ontario and Quebec, have until recently required thirteen and eleven years of schooling respectively, while the others require twelve.<sup>4</sup> Also, individuals in both countries have ways other than the "regular" schooling process to acquire their high school diploma. In the United States individuals can get certification through an equivalency exam such as the General Educational Development (GED) (see, e.g., Cameron and Heckman (1993)). As argued by Cameron and Heckman, individuals getting GED certification may be closer to dropouts than

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<sup>3</sup>Since questions on educational attainment were different in the pre-1990 LFS, it is not possible to compute a dropout rate before 1990 with that data set.

<sup>4</sup>Ontario has been implementing new standards for high school education since 1999. Like students in other provinces, students entering the system in Ontario will now complete high school in four years instead of five. Newfoundland changed its requirement from 11 to 12 years of schooling beginning with students entering grade 10 in September 1981. That is, those that completed their 11th grade in the spring of 1983 had to go through another year of schooling instead of graduating. See Sweetman (1999) for an analysis of the Newfoundland experience and of its use as a "natural experiment" to identify the return to the extra year of schooling.



to “true” high school graduates.<sup>5</sup> This may consequently inflate the U.S. high school completion rate. In Canada, more or less similar alternative routes of completing the requirement for a high school diploma exist. For example, in Quebec individuals who left high school without a diploma may get their certification through night classes. In Ontario a GED-like certification process is available for people aged at least 18 and who have been out of high school for at least a year. It is difficult to judge the relative difficulty of these different institutional arrangements in terms of getting certification as the requirements are likely to vary across countries.<sup>6</sup> In summary, it appears that Canada is catching up to the United States in terms of the rate at which at which young individuals complete high school, especially in the case of women. Yet, there still are differences when we compare the average completion rate across Canadian provinces with that of their immediate neighbours.

It should also be noted that while the parents’ educational attainment no doubt plays a role, other evidence suggests that it cannot really be the whole story behind the historical differences in dropout rates in Canada and the United States. In a recent paper, Card and Lemieux (1997) show that the fraction of men and women aged 20-24 who are enrolled in school is actually higher in Canada than in the United States, and especially so for women. They also show the *reverse* is true for individuals aged 16-17.

### **3 The Return to a High School Degree in Canada and the United States, 1981-1998.**

In this section, I document the evolution of the return to holding just a high school diploma in both countries using the 1981, 86, 91, and 96 Canadian

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<sup>5</sup>Individuals may also achieve certification through night classes.

<sup>6</sup>They may even be difficult to compare even when they have the same labels. For more details, see Government of Ontario (2000).

Censuses, the 1998 Canadian Labour Force Survey (LFS), and the 1981-1998 March Supplements of the Current Population Survey (CPS). Except for the LFS, whose earnings measure refers to the job held at the time of the interview, both the CPS and the Census ask questions on earnings and weeks worked during the previous calendar year.<sup>7</sup>

To measure the return to a high school degree, I follow Katz and Murphy (1992), Murphy, Riddell, and Romer (1998), and others, in focusing on individuals with a strong degree of labour market attachment. Consequently, I only used individuals who worked full-time for at least 39 weeks the year before the respective surveys. For 1998 I cannot impose quite the same restrictions with the LFS. I use only individuals working full-time at the time of the interview. Note that all self-employed individuals are excluded from the analysis. I also exclude people attending school, when possible.<sup>8</sup> The next step was to run a series of regressions by sex and by age group of the log weekly wage on a linear age term and a dummy indicator for high school graduation. Note that all wage observations in the bottom and top percentiles were excluded to eliminate outliers.<sup>9</sup> The high school dummy coefficients are reported in Figure 2. An overall look at these figures reveals that while the return to a high school diploma in Canada is very small for the youngest individuals compared to their U.S. counterparts, the return is actually smaller for *all* age groups. This strongly suggests that whatever factor is causing the wage premium to be smaller in Canada appears to affect all individuals with

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<sup>7</sup>In addition, the CPS (but not the Canadian Census) asks a question on usual hours worked per week in the previous year.

<sup>8</sup>The 1986 Census does not include a question on school attendance over the previous months. For 1998 with the LFS, I also exclude the summer months so as not to include summer jobs. The sample restrictions made little difference in the results.

<sup>9</sup>Although the 1971 Census could have been used as well, the questions on educational attainment made no attempt at trying to determine whether the respondents whose highest level of schooling was between grades 11 and 13 had actually graduated. It was thus impossible to directly measure the return to having completed high school relative to not completing. See Freeman and Needels (1993) and Bar-Or, Burbidge, Magee, and Robb (1995) for similar analyses with (in part) earlier data.

low levels of education. Indeed, it seems that the difference in the return to a high school diploma is the largest for workers aged 25 and above. As for the youngest individuals, the return is consistently at most half of what it is in the United States. Also, although it has been shown recently that the return to a high school degree in the United States has increased markedly over the last twenty years for workers aged 25 and over (Krueger (1997)), it appears that much of that increase is in fact the result of composition effects. Older workers' return has indeed increased somewhat over that time period but the overall rise in the average return stems from the increasingly important demographic weight of the older workers.

Such persistent differences beg for an explanation, such as perhaps the ways in which the different institutional arrangements in Canada like the minimum wage and the unionization rate interact with the operation of the labour market for individuals with low levels of education. Perhaps also the fact that Canada has a much higher proportion of individuals with some post-secondary education than in the United States (Riddell and Sweetman (1999)) and that those individuals may be close substitutes to high school graduates in the labour market might depress the wages paid to high school graduates. However, I leave this topic for ongoing research.

Overall, then, there is little in the Canadian data that suggests that the value of holding a high school diploma has increased over time or even that it is substantial. Again, it is worth reiterating that this statement applies to people who do not envision pursuing university education; in fact the "real" value of holding a high school diploma would include the expected added return from higher (university) education. However, it is still the case that high school graduates in 1998 have a larger employment rate compared to high school dropouts, even though there is very little advantage in terms of wages, conditional on having found a job.<sup>10</sup>

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<sup>10</sup>Perhaps a better way to put it would be to say that conditional on employment, the value of holding a high school diploma has been very small over the years in Canada compared to the United States.

## 4 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 and of the 18,000 individuals that 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.

Given the retrospective nature of the Follow-up, the identification of the most important job experiences of respondents relied on the notion of a “reference job”. Such a job had to last at least six months and individuals had to work at least 20 hours per week in it. Two such jobs (at most) are documented in the data set, the first one that the individuals had since they were last in school (in high school, junior high, or elementary), and the most recent one. In addition, respondents were probed about the job they held the week before the interview. That job may be the first reference job, or the most recent one, or another job if, for example, the individual has worked full time in it for less than six months. Data on all those jobs are collected on usual hours worked, occupation, industry, tenure, training incidence, and

usual wages. In addition, the time between leaving high school and the first reference job is calculated from the self-reported ending date of school and the starting date of the job.

The samples considered in the analysis are made of a larger one which includes 4,615 individuals out of the original 6,284, and which is used to show descriptive evidence on family background and school performance variables by educational attainment. The main sample used for the analysis of the impact of working on the decision to complete high school is made of 2,051 individuals who left high school either as graduates or as dropouts and who did not pursue post-secondary education.<sup>11</sup>

## 4.1 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 significantly 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.

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<sup>11</sup>1,408 records were eliminated because the respondents were still enrolled in school at the time of the follow up interview, the other deletions being due to missing data on key variables. 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, by the way, 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 data indicate that although graduates seem to have fared better in terms of employment rates<sup>12</sup>, the same cannot be said for labor earnings (or wages): both groups earn approximately the same on average and the distributions of log weekly wages shown in Figure 3 provide no evidence that high school graduates are doing any better compared to dropouts. Naturally, the wage evidence comes from the subsample of individuals who worked at least 20 hours per week in a job that lasted at least 6 months or is ongoing. This may impart some selectivity effects. But this is true also of the samples used to compute the rate of return to a high school diploma in the previous section.

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. Therefore, it seems appropriate to separate them out from the other dropouts if one wants to evaluate the differences in labour market performance between graduates and dropouts.

Not surprisingly, Table 1 also indicates that university graduates are earnings a much better wage, conditional on employment, than either one of the other groups. What might be surprising is the fact that a lower percentage of university graduates declare ever holding a reference job. However, this just serves to illustrate the limits of the SLS data in terms of analyzing the school-to-work transition of more educated people. First of all, they have been out of school for a shorter time, thus some of them may still be searching. Second, they may be in full-time jobs that began less than six months

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<sup>12</sup>Basically ALL of the difference in employment rates between graduates and dropouts is driven by women. There is very little difference for men.

before the date of the interview, which disqualifies those jobs as being reference jobs. But most importantly, the question about ever having a reference job is simply ill-suited for studying the labour market outcomes of university graduates as it specifically makes reference to jobs that began after the individual left high school. Therefore, for many university students, the wages from those jobs are likely to be simply a source of funds to finance university studies.<sup>13</sup>

Finally, if we look 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. In fact, although not shown here, this is true over a substantial range in hours worked. 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.

## 5 Local Labour Market Conditions and the Decision to Complete High School.

In this section, I analyze the decision to complete high school and the influence that local labour market conditions have through the decision to work while in school. In other words, I take into account the fact that finishing high school and having a job in the twelve months preceding the end of full-time schooling are both endogenous variables and I use the local unemployment rate as an exogenous determinant of work while in school to determine impact of such work on the decision to graduate. The unemployment rate I

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<sup>13</sup>Although not shown here, the distribution of time between the beginning of the first reference job and the date last in University reveals that the majority of observations have negative durations, which again is suggestive of those jobs being used to finance schooling.

use in the estimations reported here is the rate in the Census Metropolitan Area if the individual studied in a CMA; otherwise I use the province average excluding the CMA's.<sup>14</sup> The analysis is carried out for both men and women.<sup>15</sup>

To help organize one's thoughts, consider Figure 4 which shows optimal schooling choices for two types of individuals. The figure has been drawn so that individual 1 is indifferent between dropping out and graduating from high school while individual 2 is indifferent between stopping after completing high school or getting a university degree. If the return to completing high school stays the same while the premium to completing a university degree increases just slightly, individual 1 will still be indifferent between dropping out and graduating but individual 2 will now strictly prefer to enroll in university. In fact, an increase in the slope of the linear segment between point B and Point C, even if it is accompanied by a slight reduction in the premium to completing university, will have the effect of causing an increase in university enrollments (with a possible decrease in university completion rates). As for type 1 people, even the slightest reduction in the return to finishing high school will cause an increase in dropout rates.

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, I first use a bivariate probit model which 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

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<sup>14</sup>For those that do not complete high school, I use the unemployment rate that prevailed at the time (month) they quit school. For those that graduate, I use the annual average computed over the last four years by CMA's or province. Whether the average is computed over a shorter period of time instead of four years does not make any qualitative difference. The effect of local labour market conditions on the probability of graduation was also studied using the full 1991 School Leavers Survey sample by Dagenais, Montmarquette, Parent, Durocher, and Raymond (1998).

<sup>15</sup>See also Beaudry, Lemieux, and Parent (1999) for an analysis using aggregate time series data of the effect of local labour market conditions on Canadian school enrollment rates for the period 1976-1998.



work.

Let

$$C_i^* = X_i\beta + \delta W_i + \nu_i \tag{1}$$

$$C_i = 1(X_i\beta + \delta W_i + \nu_i > 0)$$

$$W_i^* = Z_i\gamma + \eta_i \tag{2}$$

$$W_i = 1(Z_i\gamma + \eta_i > 0)$$

where  $C_i$  denotes completion of high school,  $W_i$  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  $N(0, 0, 1, \sigma_\eta^2, \rho)$  where  $\rho$  is the correlation coefficient between  $\nu$  and  $\eta$ . The exclusion restriction imposed is that the local unemployment rate affects the graduating decision only through its effect on working while in school.

Note that the raw data (see Table 1) indicate a *positive* correlation between working while in school and high school completion. Also, the same positive correlation exists between hours worked while in school and graduation. A priori, if we thought that work while in school is bad for schooling attainment we would expect a negative correlation. However, this just serves to highlight the importance of modeling both decisions jointly as unobserved characteristics are likely to be behind such a positive correlation. For example, more motivated individuals might be more likely to work as well as to graduate. To model jointly the decision to complete high school and the choice of hours worked we also use a joint probit-tobit specification.

Results are reported in Tables 2 and 3 for the bivariate probit model. As we can see, whether the students work or not in the twelve months leading

to the end of going to high school full time is strongly related to the state of the labour market. In turn, working while in school is found to have a strong effect on the probability of graduation, for both men and women, although the men's decision to work appear to be slightly more responsive to changes in the unemployment rate. Also, results in Table 3 suggest that women's response to local labour market conditions is sensitive to the unemployment rate measure used: in both cases where we use either the provincial unemployment rate of women aged 25-44 or the overall provincial unemployment rate as instruments, working while in school does not appear to decrease the probability of graduation.<sup>16</sup> As we can see from the correlation coefficients shown in Table 2 and, for men, in Table 3 as well, the positive correlation between unobservables that affect both decisions is quite strong, as the summary statistics in Table 1 seemed to suggest: those that graduate and work are not a random sample of the population of young students. Excluding local labour market conditions from the graduation equation and allowing correlation between unobservables reverse what simple descriptive statistics would lead us, in fact, to conclude: working does seem to have the causal effect of making young 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 of poor quality. Here again, if there is a substantial wage advantage to completing high school, as all the evidence in the U.S. indicates, then that may not come as a total surprise. In any event, it seems clear that the Canadian experience is strikingly different.

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<sup>16</sup>Although not shown here, estimating the equation for high school graduation independently produces a positive relationship between working and graduating, which essentially reproduces the patterns present in the raw data.

As a check on the robustness of the results with respect to the assumption of joint normality, I estimated a linear two-stage least square model in which the local unemployment rate is used as an instrument for work activity. It is well-known that a linear probability model is flawed as an econometric model for discrete choice problems, but it does provide consistent estimates of the parameters of interest. Although the results are not shown here, I get the same qualitative conclusions.

Finally, to assess whether excluding the local unemployment rate from the outcome equation is acceptable, I performed an overidentification test by using all three local labour market measures as instruments. More specifically, I regressed the residuals obtained from the structural equation (using the parameters estimated by IV) and regressed them on the excluded instruments in addition to the other exogenous variables. Under the null hypothesis that the exclusion restrictions are valid, the R-squared from such a regression times the number of observations converges to a  $\chi^2$  distribution with degrees of freedom equal to the difference between the number of instruments and the number of parameters estimated (see e.g. DiNardo and Johnston (1997), pp. 336-338).

As it turns out, the value of the  $\chi^2$  statistic is equal to 1.39 for men, which easily passes the overidentification test. For women, though, it is equal to 30.97, which makes suspicious the identification strategy.<sup>17</sup>

## 5.1 The Impact of Hours Worked While in School

While the fact of being employed does seem to increase the probability of dropping out of high school, it would also be of interest to know how that

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<sup>17</sup>As emphasized in DiNardo and Johnston (1997), the test is not about whether all instruments are valid but only about whether given that one is valid, are the additional ones valid too. In this case, however, the fact that the instruments all try to measure the same thing implies that if the additional ones are deemed appropriate then one can probably be more confident about the validity of either one of the three in a just-identified model. The converse applies in the case of women.

probability varies with hours worked. While in principle one could simply use local labour market conditions as an instrument for hours worked and then use the predicted values of hours worked in the high school completion probit, the estimation is complicated somewhat by the fact that not every students worked within twelve months of getting out of high school. Therefore, I have to take into account the censoring at zero hours. To do this, I estimate a bivariate model in which one outcome is high school graduation, as before, and the other is hours worked, modeled as a censored regression.

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

$$C_i^* = X_i\beta + \delta H_i + \nu_i \tag{3}$$

$$H_i = Z_i\gamma + \eta_i \text{ iff RHS} > 0 \tag{4}$$

$$H_i = 0 \text{ otherwise}$$

where H represent the number of hours worked, X and Z are the same vectors of exogenous variables as in the previous model, 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 (4), we make the assumption that local labour market conditions affect the decision to complete high school only through their effect on the number of hours worked (just as in the case of the bivariate probit).<sup>18</sup>

Results are reported in Table 4. As we can see, we obtain the same qualitative conclusion as the one obtained from the bivariate probit model: working more hours causes an increase in the probability of not graduating from high school and the effects are very similar for both sexes.

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<sup>18</sup>See the Appendix for a full derivation of the likelihood function.

## 6 Conclusion

The point of departure for this paper was to note that although we keep hearing about how important it is to pursue post-secondary education given the new requirements of today's jobs, there is still a sizeable proportion of the population which does not complete high school. The natural question that arises then is why? The possibility explored in this paper is that it may just be the case that for those people whose margin of decision is between high school graduation and dropping out, people who do not really plan to go to university, the advantage of completing high school may have been low over the years. Canadian data from the Census and the Labour Force Survey suggest that this has been the case, in contrast to what has happened in the United States. Also, using data from the Follow-Up to the School Leavers Survey, it seems that graduates have no particular advantage over dropouts except in terms of employment rates.

Then, taking a step back to look at the decision process by which high school students choose to complete high school or not, I find, using Statistics Canada's School Leavers Survey that they were 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. In other words, given that there does not seem to be a major advantage to completing high school over not completing it except in terms of employment rates, once they get a job during school, many of them drop out before graduation.

One puzzle left unexplained in this paper is why is the monetary value of a high school degree so different from that in the United States. While the relationship between education and log-earnings in the United States is approximately linear (Card (1999)), that appears not to be the case in Canada. In fact, the results in this paper suggest that the relationship is rather convex. Although not shown here, using mid-points of all the educational categories included in the Census data to estimate the relationship between log earnings and years of schooling (as opposed to the education categories used in

this paper) suggests indeed that the relationship is convex and that the convexity is produced by the flattening of log earnings-schooling relationship at lower levels of education. One avenue for future research would be to try to determine whether a different institutional environment, such as the higher minimum wages in Canada, have in a sense perhaps had the effect of censoring the lower part of what may otherwise be a linear relationship, as in the U.S. Or it may be that the “true” returns to a high school diploma are, in fact, lower than in the U.S. and this may trigger some peculiar selection effects in that the quality of the pool of dropouts relative to that of the graduates in Canada is higher than in the U.S. and this selection effect may tend to make the cross-sectional return to a high school diploma lower than it actually is.

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## Appendix

Let the bivariate normal density function be expressed as:

$$f(v_i, \eta_i) = \frac{1}{2\pi\sqrt{1-\rho^2}\sigma} \exp \left[ -\frac{1}{2(1-\rho^2)} \left( v_i^2 - 2\rho v_i \frac{\eta_i}{\sigma} + \frac{\eta_i^2}{\sigma^2} \right) \right] \quad (5)$$

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

$$P(C_i = 1, H_i > 0) = \int_{-x_i\beta - \delta H_i}^{\infty} f(v_i, \eta_i) dv_i \quad (6)$$

Standardizing the bivariate normal density function:



$$P(C_i = 1, H_i > 0) = \int_{-x_i\beta - \delta H_i}^{\infty} \frac{1}{\sigma} \phi_2(v_i, \eta_i^*) dv_i, \quad (7)$$

where  $\phi_2$  corresponds to the standardized density and  $\eta_i^* = \frac{H_i - z_i\gamma}{\sigma}$ .

In similar fashion:

$$P(C_i = 0, H_i > 0) = \int_{-\infty}^{-x_i\beta - \delta H_i} \frac{1}{\sigma} \phi_2(v_i, \eta_i^*) dv_i. \quad (8)$$

The last two cases are:

$$P(C_i = 1, H_i = 0) = \int_{-x_i\beta}^{\infty} \int_{-\infty}^{\frac{-z_i\gamma}{\sigma}} \phi_2(v_i, \eta_i^*) dv_i d\eta_i^*, \quad (9)$$

and

$$P(C_i = 0, H_i = 0) = \int_{-\infty}^{-x_i\beta} \int_{-\infty}^{\frac{-z_i\gamma}{\sigma}} \phi_2(v_i, \eta_i^*) dv_i d\eta_i^* = \Phi_2\left(-x_i\beta, \frac{z_i\gamma}{\sigma}\right), \quad (10)$$

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  $\beta, \delta, \gamma, \sigma$  and  $\rho$ :

$$\log L = \sum_i^{n_1} \log \int_{-x_i\beta - \delta H_i}^{\infty} \frac{1}{\sigma} \phi_2(v_i, \eta_i^*) dv_i + \sum_i^{n_2} \log \int_{-\infty}^{-x_i\beta - \delta H_i} \frac{1}{\sigma} \phi_2(v_i, \eta_i^*) dv_i \quad (11)$$

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

**Table 1. Mean Sample Statistics**

<b>Variable</b>	<b>H.S. Dropouts with no Post-sec. Educ.</b>	<b>H.S. Dropouts with some Post-sec. Educ.</b>	<b>High School Graduates</b>	<b>H.S. Graduates with some Post-sec. Educ.</b>	<b>B.A. Degree or more</b>
Father went to Coll/Univ.	5.25%	13.93%	6.31%	10.96%	33.51%
Mother went to Coll/Univ.	3.49%	11.03%	8.54%	8.82%	24.62%
% Males	55.19%	49.83%	48.70%	44.97%	40.49%
GPA of A in H.S.	3.43%	2.51%	9.82%	18.38%	53.28%
GPA of B in H.S.	26.30%	31.19%	43.80%	48.14%	43.61%
GPA of C in H.S.	56.11%	52.29%	42.33%	31.27%	3.11%
GPA of D in H.S.	14.16%	14.01%	4.06%	2.20%	0.00%
Failed in Primary School	38.37%	25.98%	21.28%	12.35%	0.87%
Collected UI in Last 12 Months	21.99%	18.85%	19.05%	22.03%	15.05%
Collected Welfare in Last 12 Months	21.47%	17.37%	12.21%	6.29%	1.65%
With a Child	41.00%	29.66%	24.08%	16.26%	4.14%
Hours Worked while in School	13.43	15.71	13.60	12.43	8.73
Had a Job while in H.S.	56.29%	64.28%	66.36%	67.43%	58.40%
Had at least one Reference Job	80.33%	87.66%	87.12%	86.16%	71.93%
N (in the sample)	1188	285	1002	1572	568
N (in the population)*	98149	29006	168248	326097	138555

\* Obtained from the sample weights.

**Table 2. Impact of Having a Job while in School on Graduation  
Bivariate Probit Model Specification, Standard Errors in Parentheses**

Variable	A. Men		B. Women	
	H.S. Graduation Equation	Job while in H.S. Equation	H.S. Graduation Equation	Job while in H.S. Equation
Had a job	-1.2642 (0.2413)	-	-1.1664 (0.3675)	-
Local unemployment rate	-	-0.1081 (0.0319)	-	-0.0779 (0.0296)
Father went to coll/univ.	0.2968 (0.3540)	-0.0277 (0.3152)	0.2711 (0.3131)	0.0310 (0.3078)
Mother went to coll/univ.	0.5470 (0.3432)	0.1657 (0.3360)	1.1233 (0.4310)	0.4597 (0.3740)
Difficulty in maths.	0.1159 (0.1272)	0.0976 (0.1393)	0.2193 (0.1643)	0.1697 (0.1660)
Difficulty in lang.	0.1487 (0.1445)	0.1772 (0.1495)	-0.1344 (0.1858)	-0.2076 (0.2010)
Went to private school	-0.2984 (0.2532)	-0.1738 (0.3036)	0.2273 (0.2199)	0.1500 (0.3369)
GPA of A in H.S.	1.7137 (0.4716)	0.0542 (0.3556)	0.6668 (0.4797)	-0.1428 (0.4716)
GPA of B in H.S.	0.9218 (0.2857)	0.0545 (0.2673)	0.4651 (0.3505)	0.0873 (0.4087)
GPA of C in H.S.	0.3798 (0.2483)	-0.1128 (0.2561)	0.3567 (0.3615)	-0.0189 (0.4018)
Failed in primary school	-0.4169 (0.1355)	-0.3218 (0.1455)	-0.5774 (0.2129)	-0.5617 (0.2092)
With a child	-0.2445 (0.1790)	0.2133 (0.1673)	-0.8241 (0.2241)	-0.2750 (0.1552)
Regional dummies	Yes	Yes	Yes	Yes
Correlation coefficient	0.8464 (0.1590)		0.8849 (0.2230)	
Log likelihood	-179822.73		-121750.85	
N	1071		980	

Note. See text for the definition of the unemployment rate used.

**Table 3. Impact of Having a Job while in School on Graduation  
Alternative Measures Local Labour Market Conditions  
Standard Errors in Parentheses**

A. Men	Specification 1		Specification 2	
	H.S. Graduation Equation	Job while in H.S. Equation	H.S. Graduation Equation	Job while in H.S. Equation
Had a job	-1.2606 (0.2104)	-	-1.0012 (0.4587)	-
Provincial unemployment rate	-	-0.1143 (0.0320)	-	-
Provincial unemployment rate of 25-44 year-old men	-	-	-	-0.0560 (0.0342)
Correlation coefficient	0.8687 (0.1339)		0.6787 (0.2841)	
Log likelihood	-181715.28		-188305.93	
N	1071		1071	

B. Women	Specification 1		Specification 2	
	H.S. Graduation Equation	Job while in H.S. Equation	H.S. Graduation Equation	Job while in H.S. Equation
Had a job	0.0554 (0.7072)	-	0.6398 (0.8681)	-
Provincial unemployment rate	-	-0.0409 (0.0516)	-	-
Provincial unemployment rate of 25-44 year-old men	-	-	-	-0.0958 (0.0511)
Correlation coefficient	0.1350 (0.4247)		-0.1621 (0.5190)	
Log likelihood	-123427.79		-128809.60	
N	980		980	

Note. Other covariates (not shown) are the same as in Table 2.

**Table 4. Impact of Hours Worked while in School on Graduation  
Bivariate Probit-Tobit Model Specification  
Standard Errors in Parentheses**

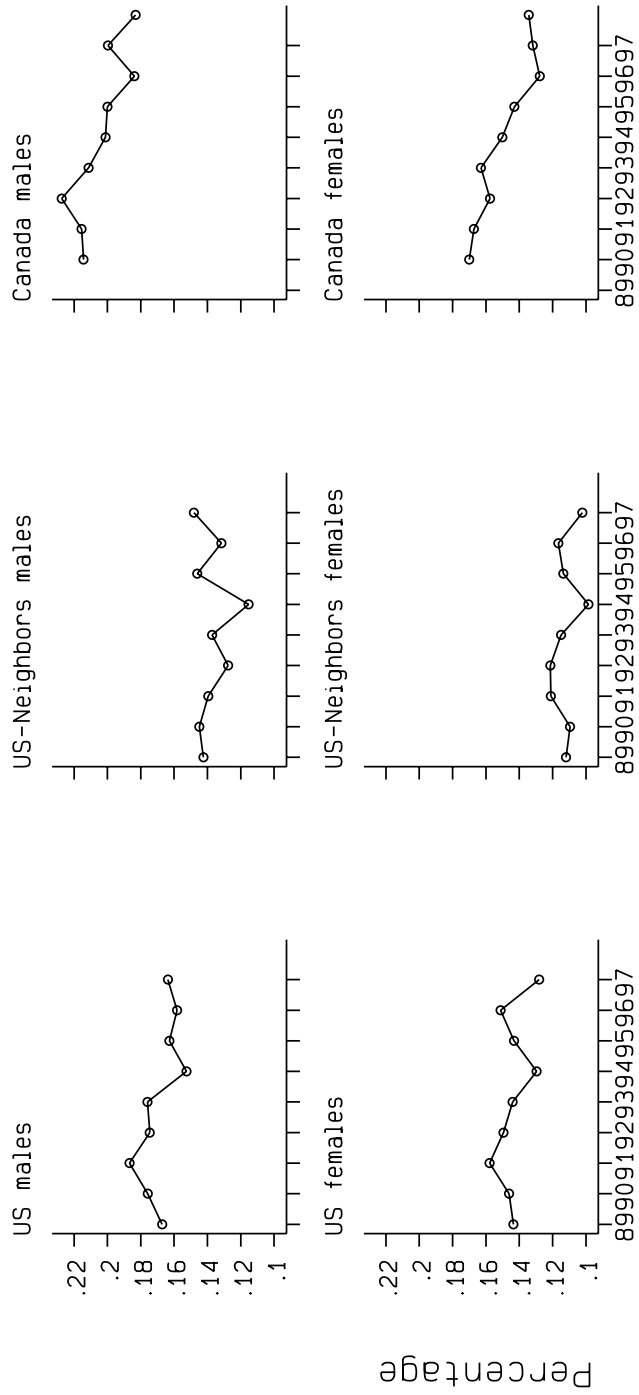
**A. Men**

Variable	H.S. Graduation Equation	Hours Worked Equation
Hours worked	-0.6079 (0.0620)	–
Local unemployment rate	–	-0.5111 (0.0574)
Correlation coefficient	0.7059 (0.1000)	
Mean log likelihood	-1.9522	
N	1071	

**B. Women**

Variable	H.S. Graduation Equation	Hours Worked Equation
Hours worked	-0.6294 (0.0624)	–
Local unemployment rate	–	-0.5839 (0.0616)
Correlation coefficient	0.6562 (0.1008)	
Mean log likelihood	-1.9317	
N	980	

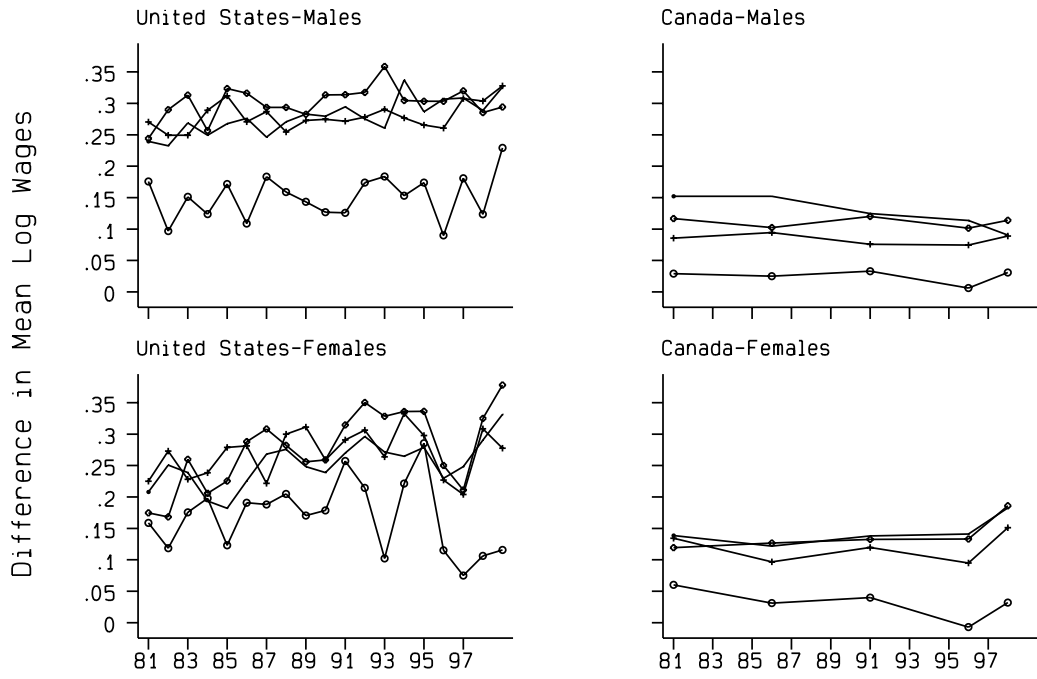
Note. Unemployment rate used is the same as the one used in Table 2.



20-21 yr-olds; Sources: Monthly CPS and LFS  
 Fig. 1. High School Non Completion Rates

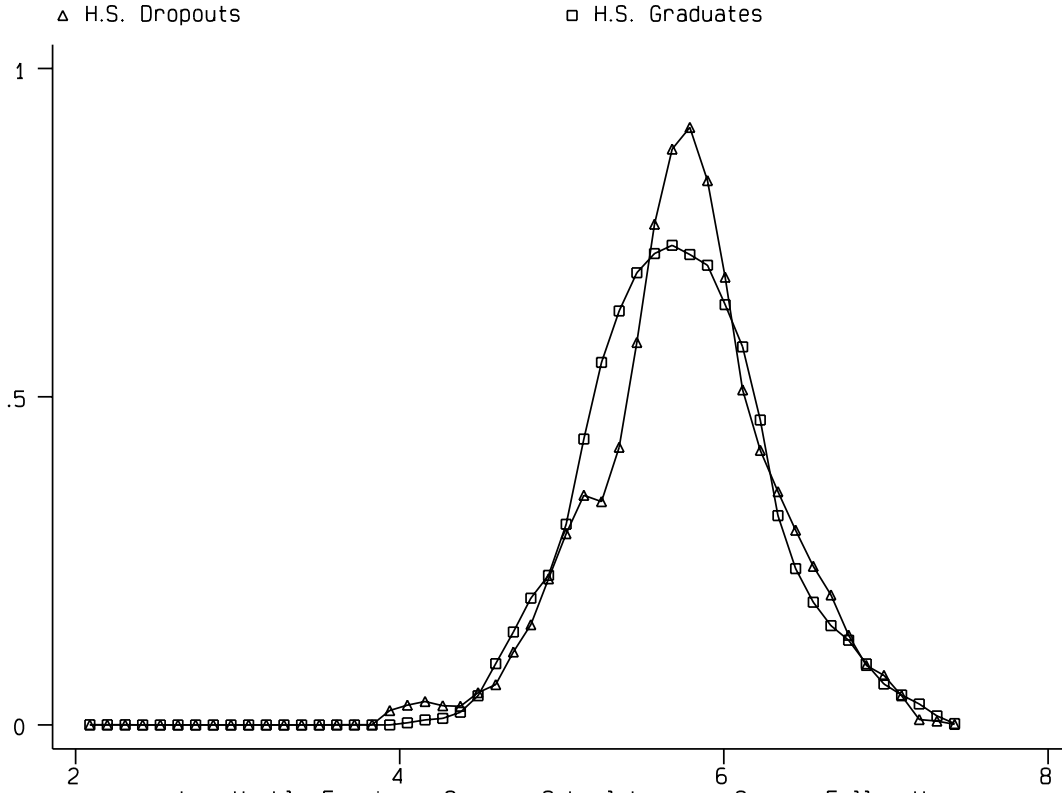
- o 15-24
- o 35-44

- + 25-34
- 45+



Note: LFS used for 1998

Weekly Earnings, U.S: March CPS; Canada: Census, LFS  
 Fig 2. Wage Gap Between H.S. Grads and Dropouts



Log-Weekly Earnings, Source: School Leavers Survey Follow-Up  
 Fig. 3. Earnings Distribution: Kernel Density Estimates



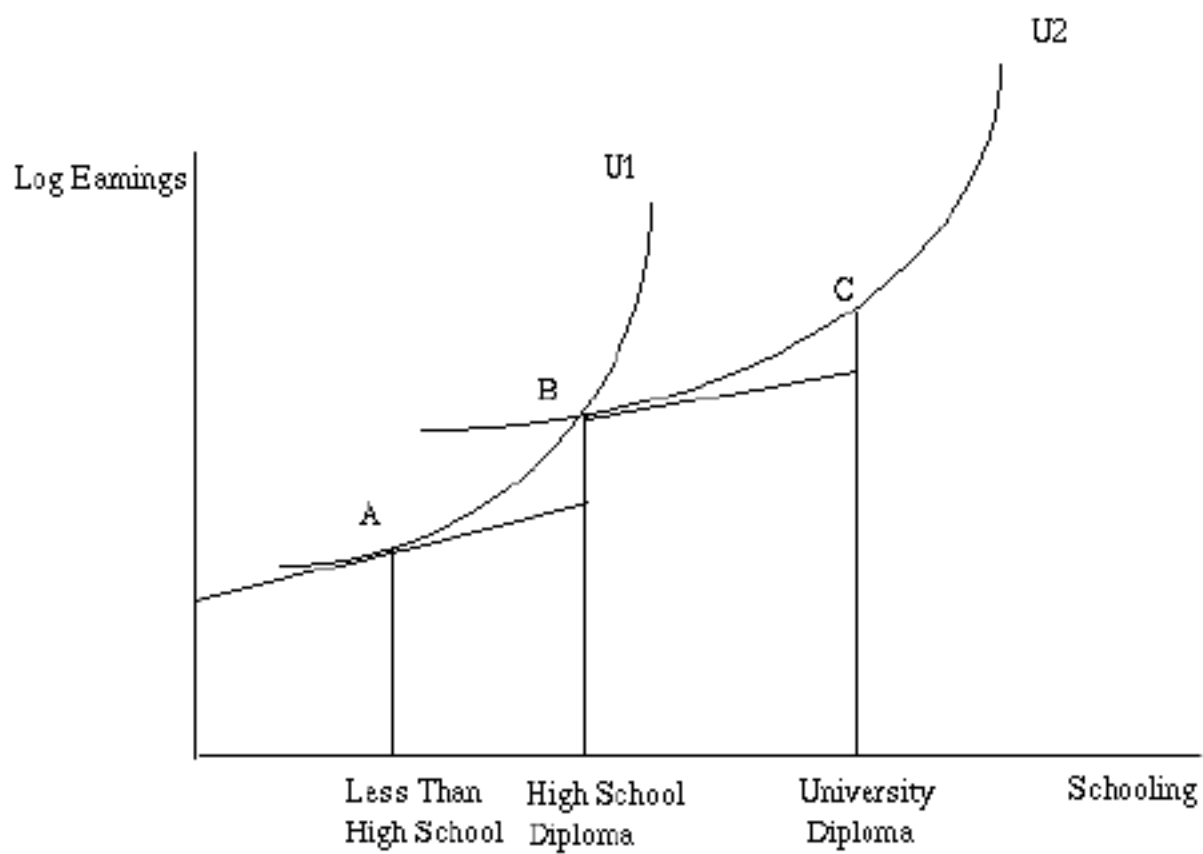


Figure 4. Optimal Schooling Choice and the Returns to Education.

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