The US/Canada Difference in Postsecondary Educational Choice

Taylor Shek-wai Hui

University of Western Ontario

10. November 2004

The US/Canada Difference in Postsecondary Educational Choice[§]

Shek-wai Hui
Department of Economics
The University of Winnipeg
515 Portage Avenue
Winnipeg, MB R3B 2E9

email: s.hui@uwinnipeg.ca

PRELIMINARY: Please do not cite or quote without permission of the author.

Draft as of 10 November, 2004

Abstract

This paper attempts to tackle the puzzle of why more Canadians choose community colleges over universities than their American counterparts, when previous research has suggested that the return to community college education is low in Canada. Using data from the Survey of Labour and Income Dynamics for Canada and the National Longitudinal Survey of Youth 79 for the US, I estimate returns to education with a trinomial selection correction using various instruments. I simulate the educational choices of Canadians who face American returns to education, and vice versa. I found that Canadians have a relatively strong incentive to choose community colleges if occupational choices are controlled for. The second finding is that Canadian universities and colleges specialize in different types of human capital. Also, my analysis confirms that the elasticity of educational attainment to tuition and fees is low. Finally, the self-selection processes in the two countries are different. More able Americans have higher educational attainment while more productive Canadians prefer going to universities but not community colleges.

[§] I thank the Social Sciences and Humanities Research Council and Statistics Canada for provision of data through the Research Data Center program. I also thank Cecilia Rouse of Princeton University for providing tuition data. I am grateful to James Davies, Chris Robinson and Jeffrey Smith for helpful comments. All errors are my own.

1. Introduction

This is a study of the difference in higher educational choice between Canada and United States. In this paper, I attempt to tackle the puzzle of why more Canadians choose community colleges over universities than their American counterparts, when previous research has suggested that the return to community college education is low in Canada. In the following, a university is defined as an institution that grants degrees at the bachelor (3 year or 4 year) level or above. A college or community college is an institution that grants certificates, diplomas or degrees below the bachelor level. It is a well known fact that community colleges are much more popular in Canada than in the US. From a 1996 OECD study, around 48% Canadians and 34% Americans aged 25 to 64 had received post-secondary education. Of those who have received post-secondary education, over 60% of the Canadians attended non-university post-secondary institutions compared to only 30% of Americans. The popularity of community colleges in Canada has been little investigated. This paper examines the factors contributing to this difference between Canada and the United States in the context of human capital theory.

In human capital theory, an individual's educational choice is a rational decision that depends on the return to education and the cost. Thus, it is expected that the return to college education relative to university education is high in Canada or that the cost of college education in Canada is low. Existing empirical evidence suggest otherwise. From previous studies, the average return to community college education relative to university education in Canada seems to be low compared to the United States. For example, using the 1998 Survey of Consumer Finance from Canada and March 1997 Current Population Survey from the United States, Pearman (2001) found that the proportion of average after-tax earnings premium of male college graduates to the university earnings premium was 23.4% in Canada and 33.5% in the United States. Therefore, returns to education estimated in the existing literature cannot explain Canadians' educational choices. Moreover, several studies (as discussed in Leslie and Brinkman (1987)) show that elasticities of the choice of educational institution to tuition are usually small. The tuition and fees of public colleges and universities are similar in Canada and the United States.[1] Even if community colleges were free in Canada, it would not have explained their popularity. Differences in the prices of education cannot explain the popularity of community colleges in Canada.

My first objective is to re-examine the earnings premium of college and university education in Canada and the United States using the more abundant covariates and instruments available in the Survey of Labour and Income Dynamics (SLID) for Canada and the National Longitudinal Survey of Youth

[1] If the difference in the educational choices is a pure supply side phenomenon, colleges in the United States could have much higher tuition and fees in a market equilibrium. The similarity of tuition structures in Canada and the United States suggests that it is not only a supply side phenomenon.

1979 (NLSY) for the United States. Ordinary least square estimates may be subject to the bias that students may not be randomly assigned into different education streams. Existing studies apply various econometric techniques to estimate the earnings effect of a year of education in United States with consideration of self-selection problem. Besides obtaining consistent returns, it is important to study the selection itself. Similar studies on the earnings effect of community colleges in Canada are almost non-existent because of the lack of suitable data. The micro-data of the Survey of Labour and Income Dynamics (SLID) recently available from Statistics Canada provides useful information for suitable estimation.

The second objective of this study is to study the functions of community colleges and universities. Most existing studies assumed that human capital accumulated through community colleges and universities is homogenous. However, if human capital accumulated through community colleges and universities are specific and different, earnings premium of college and university education are not only returns to education but also premium on the choice of human capital. Controlling for some job characteristics (e.g. occupations) sheds some light on the returns to education conditional on choice of human capital.

The third objective of this study is to determine the elasticities of the choice between college and university to the various measurable prices or costs. Due to the lack of data about the tuition and fees of community colleges, there is not much existing study about the elasticity of the choice of post-secondary education to tuition and fees in Canada. I constructed average provincial college and university fees per full time student from aggregate Statistics Canada figures in order to study these elasticities. I also consider the effect of parents' educational attainment and the unemployment rate on higher education enrolments.

Trinomial selection correction using various instruments is applied to estimate earnings effects of education. I also simulate the educational choices of Canadians facing returns to education of the Americans, and vice versa. I found that Canadians have a relatively strong incentive to choose community colleges. Earnings premium of community college education in Canada could be as good as the earnings premium of university education once job and employer characteristics are controlled for. The second finding is that Canadian universities and colleges specialize in different types of human capital. Also, my analysis confirms that the elasticity of educational attainment to tuition and fees is low. Finally, the self-selection processes in the two countries are different. More able Americans have higher educational attainment while more able Canadians prefer going to universities but not community colleges.

In next section, I review some of the relevant studies on returns to higher education and the

factors of post-secondary educational choices. Section 3 discusses the theoretical and empirical model used in this study. Section 4 describes the data and presents summary statistics. Section 5 reports the major empirical findings of my study. The last section summarizes the major findings.

2. Previous Literature

Many studies of educational choice are based on the theoretical study by Willis and Rosen (1979). Suppose there are I individuals and n available levels of schooling or types of education. Let Y_{ij} be the potential lifetime earnings and V_{ij} be the utility of choosing school level j for person i. X_i and Z_i are observed factors affecting earnings and value respectively, while τ, ω are unobserved heterogeneity. The basic model is,

$$Y_{ij} = y_j(X_i, \tau_i), \tag{1}$$

$$V_{ij} = g(y_j, Z_i, \omega_i), \tag{2}$$

$$V_{ij^*} = \max_{j \in \{1,\ldots n\}} (V_{i1}, \ldots, V_{in}), \tag{3}$$

$$(\tau, \omega) \sim F(\tau, \omega).$$

There are two important implications from this model of educational choice. First, individual choice is based on comparative advantage. Individuals with a small utility of a particular level could choose this level as long as all other feasible schooling levels provide even lower utility. Therefore, heterogeneous returns to the same type of education are possible. Furthermore, there is unobserved heterogeneity in this model. For example, τ can represent unobserved ability measures that affect lifetime earnings at all levels of education. ω can reflect the unobserved cost or utility in obtaining the education. There is no restriction on the correlation between these two sources of heterogeneity.

2.1 Return to Education

If the unobserved heterogeneity τ, ω are mean independent to the choice j, a popular educational choice would be reflected by a higher average return or lower average cost conditional on observed characteristics X_i and Z_i. Pearman (2001) attempted to explain the US/Canada difference in choices of colleges and universities by average earnings effects of education. He used the 1998 Canadian Survey of Consumer Finance and the March 1997 US Current Population Survey to estimate the wage and earnings equations. Both equations controlled for the potential work experience, gender, marital status, presence of children, immigrant status and level of education. In his analysis, the wage premium of male college graduates as a fraction of premium of male university graduates in Canada is 29.8%, while it is 31.6% in US. Using the after tax earnings premium, the college earnings premium of a typical man is only 23.4%

of his university earnings premium in Canada, while it is 33.5% for a typical American. Results of the same estimation for women show that their average return to college education is even lower. Thus, simple estimation of wage premium could not explain the popularity of college education in Canada.

Ferrer and Riddell (2002) estimated earnings equations controlling years of schooling, experience and experience squared, regions, marital status, aboriginal status, minority and language, as well as a set of credential dummies using the Canadian Census microdata. If years of schooling are not accounted for, the total effects on earnings is 11.5% and 13.8% for male and female college graduates respectively. University graduated men and women earn 35.6% and 46.7% more than their high school graduate counterparts. Ferrer and Riddell (2002) parallel results from Pearman (2001).

Pearman's estimation of the earnings effects of education did not consider possible non-random selection on unobservable characteristics and possible heterogeneity of human capital from colleges and universities. For example, conditional on observable characteristics, if more productive workers are benefitted more from university instead of community college, the observed university graduates will have higher wages and earnings. The self-selection problem will bias the estimated earnings effects of education because ordinary least square estimation will include the difference in abilities into the estimated returns.

There is evidence that Canadian college graduates sort themselves into the programs. Caponi and Plesca (2000) estimated several binary choice selection models using the 1994 Canadian General Social Survey to tackle the paradox of why Canada has a higher percentage of its population with a post-secondary education but lower labour productivity than that of the United States. They controlled for gender, age, marital status and province in their earnings equations and used parents' education, province of high school education, indicator of being the first child of the family and number of siblings as instruments. They estimated three binary choice Heckman's selection models: high school graduates vs. post-secondary educated, high school graduates and college educated vs. university educated, and college vs. university. Their results from all three models show that community college graduates have lower predicted earnings than both university graduates and high-school graduates. In other words, college graduates in Canada are least productive. The existing literature from the United States does not show this pattern.

In the United States, community colleges were not of particular interest of economists, partly because some earlier commentators suggested community college graduates have negative wage or earnings premiums.[2] These earlier studies examined employment right after education and compared college graduates to high school graduates with established career paths. Recent studies avoid this

[2]See Breneman and Nelson (1981), Wilms (1974), Wilms and Hansell (1982) and Pincus (1980).

mistake by concentrating on workers who have more experience; these studies have found substantial return to a community college education. Grubb (1993) measured earnings at the age of 32 from the National Longitudinal Survey of the Class of 1972 and estimated the returns to various types of post-secondary education. He found that vocational associate degrees[3] provide roughly a 10% return, while even two-year college dropouts have around a 4% return per year in the college. His study is among the first batch of studies that carefully control for job experience and family background, along with personal ability as measured by test scores and high school grades.

The influential study by Kane and Rouse (1993) examined the return to community college in the United States using data from the National Longitudinal Survey of 1972 at 1986 and the National Longitudinal Survey of 1979 at 1990. To address the problem of self-selection bias in estimation of return, they applied instrumental variable (IV) estimation. In the published version (Kane and Rouse, 1995) they used the Barnow-Cain-Goldberger (BCG) estimator[4] which assumes that including observable characteristics in earnings equation will sufficiently capture any non-random selection. Tests of over-identifying restrictions using distance to the nearest college and public tuition fees do not reject the BCG estimator. They also control for gender, race, region, community size, parents' income, parent's education, parents' occupation, percentile of high school ranking and total ability score in their wage and earnings equation. Results from both NLS-72 and NLSY-79 show a 4% to 8% return on wages and earnings from a year of community college education, even without completion of an associate degrees. This is in contrast to a 0.2% to 16% return on a year of university. Returns to both associate degree holders and bachelor degree holders are larger for women, suggesting larger credential effects for women. Leigh and Gill (1997) found similar returns to community college education for workers returning to school after the age of 25 using NLSY-79. They also estimate that the incremental effects of return on earnings and wages of returning to 2-year college rather than going to 2-year college directly from high school are insignificant, irrespective the completion of programs.

Gill and Leigh (forthcoming) applied the polychotomous selection model developed by Lee (1983) to data from the 1994 wave of the NLSY-79 to tackle selection bias from unobservable. In the selection equations, they included school ability and work ability as measured by Armed Services Vocational Aptitude Battery (ASVAB), desired level of education, the presence of the parents in the household at age 14, education levels of the parents, number of siblings, self-reported financial constraints and other non-financial constraints. Their wage equations include degree obtained, school ability, work ability, job tenure, part-time employment status, gender, race and the selection correction

[3]Vocational associate degrees are certificates of the 2-year vocational programs in colleges in the United States.
[4]See Barnow, Cain and Goldberger (1980). BCG estimator treats self-selection problem as omission of variables. Refer to discussions in next section.

terms. Their results show that there is positive selection for students going into university and into terminal community college programs[5] . For a random high school graduate, the average wage premium from completing a terminal college program is 14.4% while the average wage premium from completing a 4-year university program is 25.4%.

2.2 Prices and Costs of Education

Equation (2) shows that differences in direct costs may also explain the popularity of community colleges in Canada. The most important direct cost of higher education is the price – tuition. Existing studies find that the elasticity of educational attainment to fees and tuition is low. The empirical research reviewed by Hearn and Longanecker (1985) found that higher tuition would have small effects on enrolment rates. Indeed, they estimate that a USD100 (in 1984 dollars) increase in tuition would have lower post-secondary education incidence by 1.25% to 1.5%. It is also suggested that lower income students are more price elastic than upper income students. The meta-analysis of studies on the elasticity of post-secondary enrolment by Leslie and Brinkman (1987) supported this observation. In the United States, a typical community college student comes from a low income family. Indeed, in all of the studies Leslie and Brinkman (1987) considered, community college students' response to tuition is more sensitive: a USD100 (in 1986 dollars) increase in tuition would decrease college enrolment by more than 3%, while most studies on all post-secondary education give 1.5% to 2.4% results. These estimates do not represent cross elasticity between 2-year college and 4-year university enrolment rates. The elasticity of college education to university tuition and the elasticity of university education to college tuition may be of important in determining the educational choice.

Two recent studies confirm that the elasticity of attendance is low and provide some insights on the cross elasticities. Kane (1995) noted that previous studies using cross-sectional data are subject to bias[6] on the elasticity of post-secondary education on tuition cost. He estimated state fixed-effect model of tuition and enrolment rates by using time series administrative data for the period 1980 to 1992. Controlling for the state employment rates and the need based grants, he finds that a USD100 (in 1992 dollars) increase in public 2-year tuition leads to a 1.1% drop in public undergraduate enrolment rate while a USD100 increase in public 4-year tuition will reduced undergraduate enrolment rates by 0.44%. The following table[7] is calculated from his study. It is evident that public 2-year program's tuition may

[5]Terminal community college programs refer to 2-year college education that students did not continue their study to the senior years in the 4-year bachelor degree programs.
[6]Kane (1995) argued that the existence of difference in all other policies could bias the estimated tuition effect on enrolment. For example, the forgone earnings of going to college or university in states with higher minimum wages are higher. However, if states with higher minimum wages also have lower tuition, estimated elasticities of education would be biased if this difference in policies was not considered in estimation.
[7]Created from estimates in the Table 2 of Kane (1995)

be important in the relative choice of 2-year and 4-year programs:

Enrolment:	Public 4-year	Public 2-year	Private 4-year
Public 2-year Tuition	1.11%	-2.97%	0.6%
Public 4-year Tuition	-0.74%	0.32%	0.75%

Rouse (1995) used the 1980 High School and Beyond data to study whether community colleges divert students from universities and lower the overall educational attainment. She presented results from two linear probability models of 2-year college and 4-year college incidence. In her estimation, she controlled for the proximity to 2-year and 4-year institutions, gender, race, High School and Beyond test score, parents' education, family income, family home ownership, percentage white in high school, high school in urban area, high school area unemployment rate, census region and state income per capita in 1980. She finds that a USD100 (in 1980 dollars) increase in two-year in-state tuition reduces two-year college incidence by 0.93 percentage point but increases four-year college incidence by 1.13 percentage points. A USD100 increase in four-year in-state tuition increases two-year incidence by 0.56 percentage point but reduces four-year college incidence by 1.27 percentage points. Her results are consistent in signs with Kane (1995) but larger in magnitude. In contrast, Kane (1995) did not examine the erogeneity of the instruments used, while Rouse (1995) found her results were robust when instruments were added sequentially.

In 1996-97, a full-time US community college student paid on average USD1283 per year for tuition while university students paid USD2986. (U.S. Department of Education, 1997) The average fee paid per person to Canadian community colleges is CAD1307 and CAD2980 in 1995. Thus, it would not be possible to explain the popularity of community colleges in Canada even if they are free.

Another type of cost incurred when attending colleges and universities is transportation and relocation. Transportation costs increase with the distance to the college or university. When colleges and universities are too far away, relocation is necessary to obtain higher education. The distance to the closest post-secondary institutions provides a crude measure of the transportation and relocation cost of attending college and universities. College proximity can lower the cost of attending college. Those who face particularly high borrowing costs are expected to be more sensitive to costs lowered by college proximity. Rouse (1995) used the miles to community college and university as instruments to study the effect of community colleges on educational attainment. The reduced form estimates show that distance negatively affects educational attainment. Miles to the nearest community college are negatively related to the incidence of going to community college, but positively related to university attendance. The reverse effects are also true. She concluded that distance to post-secondary education is an exogenous instrument for the estimation of education incidence. Card (1995) used proximity as an instrument to

estimate the return to schooling. He noted that proximity to two year colleges seems to have little impact on educational attainment.

Cameron and Heckman (2001) found that long run factors associated with parental background and family environment are the major factors affecting racial-ethnic or income class college-going differentials in the United States. They do not reject the hypothesis that price responsiveness is the same across income quartiles. They suggested that this insensitivity results from the fact that 4-year college or universities draw from the academically better prepared high school graduates. The major factor is academic readiness. A high school graduate who did not prepare well for entering 4-year college is insensitive to the 4-year college tuition.

One related to the price of education is the availability of subsidies and loans. Both Kane (1995) and Cameron and Heckman (2001) found that Pell grants' effects on training incidence are much lower than that of the tuition. Kane (1995) speculated that poor families have less reliable information on the availability of Pell grants. Heckman, Smith and Wittekind (1997) found that low-income high school graduates are more aware of Pell grants than high school dropouts. Cameron and Heckman (2001) suggested that many individuals who qualified for Pell grants are not scholasticly prepared for college.

2.3 What is Missing?

In summary, the existing literature does not provide evidence that supports explanation based on human capital theory to explain the popularity of community colleges in Canada. Return to community colleges in Canada is low. The elasticity of college attendance to tuition is very small that differences in tuition and fees are not likely a major factor. Canada and United States have rather integrated economies, share a similar culture and have similar education systems. What is missing from the picture?

As discussed above, two major issues are not addressed in Canadian studies on the community colleges. First, the self-selection into college and university may be different in Canada and the United States: previous studies show that least productive workers choose college in Canada while most American studies suggest that more productive workers choose colleges and universities. Previous estimates of the earnings effects of college and university education using least squares on limited set of observable personal characteristics may subject to self-selection bias. Application of modern techniques of selection bias reduction or correction to Canadian data is needed. The difference in self-selection may shed some light on the institutional difference across two countries. The second issue is related to the first. We want to study on the different functions of community college and university in advancing a person's productivity. If human capital accumulated through community colleges is different from that accumulated through universities, then the observed educational choice may reflect choice of the types of human capitals.

3. Model

Suppose individual *i* has only three choices, $j \in \{h,c,u\}$ corresponding to graduation from high school, college and university respectively. The final target is to estimate a tri-nomial discrete choice version of (1) to (3)

$$\begin{aligned} & V_i^j = \beta_0^j + \beta_E^j E_i + \beta_c^j C_i + \beta_X^j X_i + v_i^j, \\ & j \in \{h,c,u\}, \\ & D = k \ if \ V_i^k = \max\{V_i^h, V_i^c, V_i^u\}, \end{aligned} \tag{4}$$

where E_i is a vector of returns to college and university education, C_i are variables representing prices and costs of education (tuition, fees and unemployment rate), X_i are variables describing personal and family characteristics (race and parental educations) and v_i^j is the unobserved heterogeneity.

It is essential to estimate the wage or earnings of an individual for each alternative type of education. The earnings equation is

$$\ln Y_i^j = \alpha_o^j + \alpha_X^j X_i + \varepsilon_i^j, \tag{5}$$

where X_i is a vector of personal characteristics and labour market experience. The wage or earnings premiums associated with community college and university are,[8]

$$E(\Delta^c \mid X, D = j) = E(\ln Y^c \mid X, D = j) - E(\ln Y^h \mid X, D = j), \tag{6}$$

$$E(\Delta^u \mid X, D = j) = E(\ln Y^u \mid X, D = j) - E(\ln Y^h \mid X, D = j). \tag{7}$$

To study the Canada/United States difference in post-secondary educational choice, the natural parameters of interest in this paper are "treatment effects on the treated" $E(\Delta^k|X,D = j)$ instead of "average treatment effects" $E(\Delta^k|X)$.

The problem is, we do not observe $E(\ln Y^k|X,D = j)$ if $k \neq j$. That is, we do not observe the wage or earnings of an individual had she chosen alternative type of education. Suppose ε^j is independent to *X*. If we replace the unobservable $E(\ln Y^k|X,D = j)$ by $E(\ln Y^k|X,D = k)$, the estimated earnings premiums are

$$\delta^c = E(\Delta^c \mid X, D = j) + [E(\varepsilon^c \mid D = c) - E(\varepsilon^c \mid D = j)] - [E(\varepsilon^h \mid D = j) - E(\varepsilon^h \mid D = h)], \tag{8}$$

$$\delta^u = E(\Delta^u \mid X, D = j) + [E(\varepsilon^u \mid D = c) - E(\varepsilon^u \mid D = j)] - [E(\varepsilon^h \mid D = j) - E(\varepsilon^h \mid D = h)]. \tag{9}$$

If ε^j is mean independent of the choice *D*, the later terms of (8) and (9) will be zero and (8) and (9) are consistent estimates of (6) and (7). However, if there is selection on the unobserved heterogeneity in ability as specified in (1) to (3), (8) and (9) will be biased estimates of earnings effect of education.

[8] For the simplicity of presentation, individual subscript *i* is dropped in the following.

There are several commonly used strategies to tackle this selection bias problem on cross-sectional data. Barnow, Cain, Goldberger (1980) suggested that this is indeed a problem of omission of variables. Assume that there are observable Z_i such that $E(\varepsilon^k \mid Z, D = k) = E(\varepsilon^k | Z, D = j) = \gamma Z$. Including Z_i in the earnings equations makes the estimates of the casual effects of schooling consistent. Three difficulties exist in the Barnow-Cain-Goldberger (BCG) estimator. First, it is very unlikely to have observed sufficient factors in reality. Second, even all factors are observed, the choice of factors could introduce another type of bias. For example, a commonly used strategy is to include testing scores to capture the unobserved ability difference. However, if the test score is measured during or after the schooling under consideration and if schooling results into higher test scores, which in turn affect a person's career, inclusion of test scores might capture some of the effect of schooling on earnings. Third, if the effect of schooling is heterogeneous, the BCG estimate on the effect of schooling is inconsistent. (Card, 1999)

The instrumental variable (IV) approach is another commonly used method. Valid instruments are exogenous to ε conditional on X but correlated with the level or the type of schooling. In (1) to (3), the cost factors in Z_i are probably good instruments. Educational choice conditional on the instrumental variables would be mean independent from the unobserved heterogeneity. An advantage of instrumental variable estimation is that it does not require as many variables as Barnow-Cain-Goldberger estimator does. Also, even if the effect of schooling is heterogeneous, instrumental variable estimation still provides consistent estimates of earnings effect of education.[9] However, if the instruments to be applied are not mean independent to the unobserved heterogeneity, instrumental variable estimation might produce even larger bias than simple OLS or the Barnow-Cain-Goldberger estimator, as shown in Card (1999).

Another strategy used in the literature is the Heckman's bivariate normal estimator. By imposing distribution structure on v and ε, effects of education can be consistently estimated. Heckman (1979) shows that by including the estimated inverse of Mill's ratio[10] from a binary selection rule into the earnings equations, biased arise from selection on unobservable would be eliminated. In the first stage, the reduced form selection rules are estimated. The estimated propensities of choices are available from the first stage to be incorporated into the second stage earnings equation estimation. More efficient estimation on binary selection can be obtained by full information maximum likelihood method. Lee (1983) extended Heckman's work to multinomial selection rule, while Garen (1984) generalized it to a

[9] If the person-specific component of the impact is correlated with the instrument, IV is consistent only for the local average treatment effect (LATE) estimation.

[10] Some authors prefer to call it non-selection hazard instead of inverse of Mill's ratio.

continuous treatment variable as in the case of schooling. Notice that identification of Heckman's selection model relies solely on the linearity assumption if the exclusion restriction is not satisfied.

All cross-sectional strategies require information on factors of selection. Family background variables, such as parents' educational attainment are often used as instrument. Families with more educated parents are usually more resourceful. If the cost of borrowing for education is higher for poorer families, it is expected that people with more educated parents will have higher educational attainment. There is no clear theoretical reason that parents' education should affect wages and earnings, conditional on schooling. Another frequently used instrument is the number of siblings. As the number of siblings increases, fewer resources will be devoted to a particular child. Therefore, a person with more siblings bears higher cost of getting higher education. Single parent families also have fewer resources available for education of children. Although Card (1999) argues that family background may have independent casual effects on earnings, the existing literature usually does not reject the validity of using family background variables as instruments.

Card (1995) uses proximity to college as an instrument to estimate the earnings effect of schooling using data from the original young men's cohort of the National Longitudinal Survey 1966 (NLSY66). College proximity may not be a good instrument if observably identical families have different unobserved tastes for education, and as a result choose to live different distances from a college. The estimation may also reflect unobserved geographic wage premia instead of the earnings effect of schooling. He demonstrated that results are robust to different specifications of controlling for the local labour market conditions. Thus, if college proximity is available it may be another valid choice of instrument.

The commonly used cross sectional strategies discussed have their own strengths and weaknesses in tackling the self-selection bias. Indeed, Heckman, LaLonde and Smith (1999) suggested that there is no simple rule for determining the best method of handling the self-selection problem. Therefore, I will utilize several methods. First, I will estimate the earnings effects of education by various methods. First, I will estimate ordinary least square regression of earnings on potential working experience, region and race. I will also use the BCG estimator where the extra variables to be included in the regression are tuition, parents' education, university and college proximity for observations for Canada and number of sibling and single parent status for United States. After that the tri-nomial selection correction model of Trost and Lee (1984) will be used to estimate selection corrected wages and earnings.

Observed wage and earnings may include compensation for the undesirable job characteristics. If the distributions of these job characteristics are not the same among graduates from different types of education, the estimated earning effects of different type of education represents not only the difference

in human capital if these job characteristics are not controlled for. Also, if colleges and universities are advancing specific human capital, treating them as homogenous would lead to non-comparable estimates. For instance, a person who determines to become an auto mechanic could be benefit more from the practical career programme of community college. The counterfactual estimated earnings if this person goes to university are the earnings of this person who attends university and possibly chooses a typical university graduate's career. Thus, the estimated earnings effect of university education for this person includes components of career choice. We may extend X_i to include job and employer statistics to control for this difference. However, the choice of career or job characteristics can also be endogenous with the educational choice. If certain job characteristics are caused by educational choice, the premia from these job characteristics should be counted as part of the earnings effect of education. For example, if the earnings premium of a medical doctor is 80%, and university education is a must to become a doctor, this 80% should be included as the earnings effect of university education. We could model the career and educational choices as jointly endogenous and try to estimate the pure earnings effect of education. This empirical model will be complicated. It is also difficult to find suitable instruments for such estimation. In the following, I will compare estimates from the benchmark model described above with estimates conditional on job characteristics. Differences in results between these two specifications will help to clarify the roles of colleges and universities.

4. Data

4.1 Data Sources and Sample Construction

Extracting data from comparable surveys is important in order to have comparable estimates. The National Longitudinal Survey of Youth 1979 has been used in many previous studies of schooling choice and returns to education because of the extensive information on the respondents' family background and personal history. The usual advantage of extensive cohort coverage in other surveys such as the Current Population Survey is not applicable. Community colleges experienced rapid expansion and transformation during the 1960s and early 1970s. It takes extensive care to control for the variation in supply factors overtime if older cohorts are used. Moreover, as shown in Bar-Or, Burbidge, Magee and Robb (1995), there are rising returns to more recent university graduates and returns are not stable for the first five years after graduation using Canadian data. Thus, concentrating on a particular cohort will be simpler to handle for the corresponding Canadian data. The NLSY covers the population aged 31 to 39 in 1996. Most respondents finished their post-secondary education during the late 1970s and early 1980s and have been in the labour market for more than 10 years.

The most similar data for Canada is the Survey of Labour and Income Dynamics (SLID). There

is no longitudinal survey in Canada that has a structure similar to that of the NLSY. Other Canadian survey data, such as the Labour Force Survey, lack the information to be used as instruments in the estimation. SLID has information about the educational attainment of respondents' parents as well as the respondents' geographic location, so that proximity to colleges and universities can be constructed.[11] SLID 1996 is chosen because 1996 is the first year with the second representation sample[12] .

The data from the NLSY are restricted to observations of non-immigrant men who were residing in the United States, had graduated from high school and were not students in 1996. There are 3155 observations, out of which 3054 observations have positive usual weekly earnings (Table 1).

The data from the SLID are also restricted to observations of non-immigrant men aged 31 to 39 who have graduated from high schools and were not students in 1996. There are 2909 observations in the sample, of which 2452 have positive usual weekly earnings.

The tuition figure of two-year and four-year post-secondary institution in United States before 1989 is from the Washington State Board of Higher Education. Data after 1988 are obtained from the Digest of Education Statistics. It is converted to 1996 US Dollars by CPI.[13]

There are no historic tuition statistics for community colleges in Canada. To construct an estimate of the fee paid by post-secondary students, I divided the total fees received by post-secondary educational institutions in each province by the total full time equivalent[14] enrolment figures published by Statistics Canada.[15] Notice that this is a noisy approximation to the price of education for an average student. First, no part-time enrolment is recorded for community colleges before 1983. Also, it is unknown how Statistics Canada gathers the information. Indeed, the enrolment figures for community colleges in Manitoba from Statistics Canada show obvious errors.[16] Fees are converted to 1996 Canadian Dollars using the CPI.[17]

The year of college entry is constructed by deducting two from the year in which the last certificate, diploma or degree was received. Similarly, the year of entering university is constructed by deducting four years in the United States and three year in Canada[18] . It is supposed that American

[11]Due to recent change in requirements, Geocode data of NLSY79 is no longer available to researchers outside United States. The author does not have access to the Geocode data of NLSY79.
[12]SLID follows a respondent for six year. The first representative sample was started in 1993 and the second representative sample was started in 1996. Thus, cross-section sample of wave 1996 has double sample size then that of earlier waves.
[13]United States CPI is obtained from the web site of the Bureau of Labor Statistics.
[14]3.5 part time students are counted as 1 full time student.
[15]CANSIM: Cross-classified database, table 00580402, 00580701, 00580702, 04780004 and 04780008.
[16]The full time enrolment of all community colleges in Manitoba from Statistics Canada is much smaller than the reported full time enrolment at Red River College, one of the three community colleges in Manitoba. In the sample used in this study, respondents from Manitoba are matched with national average figures (without Manitoba) instead of the provincial figures because of this obvious mistake.
[17]Canadian CPI is obtained from CANSIM II database of the Statistics Canada.
[18]Honours degrees in Canada takes 4 years studies. However, there is no indication whether degree obtained is in general level

respondents would receive higher education from the state in which they resided when they were 14. Canadians are supposed to go to college or university in the province where they finished most of high-school. Provincial or state tuition and fees are matched by entrance year and state/province to each respondent. Undetermined cases are assigned the national average. The unemployment rate in the entrance year is also matched.

Direct distance to the closest college and university in Canada are calculated from the latitude and longitude of current residence if the respondent lives in the same province as they finished most of their high school.

Table 2 presents some summary statistics for the sample. Only the main job's characteristics are used in my estimation. The dispersion of earnings in Canada is smaller than in United States in terms of coefficients of variations. The sample shows the significant differences in educational choice that motivate my analysis. Community colleges are very popular in Canada while universities are preferred in the United States. The weighted average of educational attainment is shown in the first row of Table 3. 55.3% of male Canadians who have at a least high school education finished community college programs compared to only 13.7% in United States.

4.2 Bivariate Statistics

Table 3 shows the variation in some job characteristics with educational attainment. The mean usual hourly wages and weekly earnings of college graduates and high-school graduates are almost identical in Canada, while colleges in the United States provide a 20% earnings premium over high-school. University graduates in the United States have 74% higher earnings than high school graduates. In contrast, university graduates in Canada earn 28.7% more than the high school graduates.

The employment rate varies little with educational attainment in Canada. In the United States, university educated are more likely to be employed and working full time. More educated workers in both Canada and the United States are less likely to be union members and more likely to be employed by large firms. Job tenure decreases with educational attainment in Canada. Workers with a community college education in the United States have the shortest job tenures. Also, college graduates are most likely to work full time in Canada. Using weekly earnings to measure the effect of education will capture the difference in working hours. This paper will make use of the usual weekly earnings to measure earnings effects of educations.

There are large differences in occupations by educational attainment. Over 70% of university educated workers work in the professional, technical and kindred or managers, and officials and

---

or honour level in Canadian data. More students were in general level than honour level. Since the change of tuition and fees is not large from a year to another year, 3 years studied is assumed.

proprietors occupations, in both countries. 62% Canadian college graduates are in "Other" occupations, compared to only 45% of their American counterparts. Indeed, Canadian college graduates have occupations similar to those of high school graduates, while American college graduates are somewhere in between high school and university graduates. There are two implications of the differences in the distributions of occupations. First, human capital acquired from colleges and universities may be at least partly specific and not homogenous. Therefore, it is important to examine differences in the earnings effects of education conditional on the type of human capital. Second, if part of earnings is the compensation to the difference in job characteristics in different occupations, estimated earning effects of education from the standard earning equation are biased estimates.

5. Estimation and Results

Table 4 lists the variables used in the various models. The benchmark model includes potential working experience, indicators for urban area and census areas, aboriginal status and black. There are too few observations on Hispanics in Canada[19] to include this variable. An indicator for a first language other than English is used instead (all Americans in the sample indicate English as their first language.) The benchmark models for Canada and the United States are labelled "CA" and "UA", respectively.

The BCG models that include real college and university fees or tuition, parents' educational attainment, etc are listed as models CC and UC for Canada and United States, respectively. The variable indicating college and university proximity for Canada is included in model CC. For the United States sample, model UC includes the number of siblings and single parent status.

Models conditional on job characteristics add union membership, collective agreement coverage, job tenure, employer size and occupation to the benchmark models CA and UA. They are listed as Models CB and UB. Similarly, BCG models conditional on these job characteristics are denoted models CD and UD, respectively.

The Trost and Lee (1984) model is estimated in two stages[20] . In the first stage, a trinomial logit choices model is estimated with the variables in CC and UC, except for the potential labour market experience[21] . Then the predicted probability of a particular choice can be used to construct the negative inverse Mill's ratio as in Lee (1983), which is then included in the estimations of Models CA, UA, CB and UB in the second stage. Because of the heteroskedasticity of the second stage estimation, standard

[19]As adviced by the Statistics Canada, estimates related to ethnicity on Canadian data are suppressed to protect privacy.
[20]Results from full information maximum likelihood estimation of Trost and Lee (1984) model are not materially different from that of the two-step procedure. Two step procedure is used for it's simplicity.
[21]Potential market experience calculate as age minus 6 and the number of years of schooling. This is excluded from the trinomial logit because the number of years of schooling is highly correlated with the educational choice.

errors are estimated by bootstrapping with 400 repetitions.[22]

5.1 Is the Return to College Education in Canada Low?

The ordinary least square estimates of the benchmark models CA and UA are presented in Table A1 and Table A2. Notice that the covariates used in Canadian sample are only weakly related to the earnings. Including interaction terms using the variables in CA as well as introducing more regional variables does not yield any improvement. Table 5 presents the mean predicted weekly earnings from estimation of CA and UA, by actual educational attainment. Table 6 presents the earnings premia in percentage.

The results in Tables 5 and 6 display the same puzzle found in the previous literature. The college earnings premium in Canada is 7.2%, compared to the university premium of 30.2%, while college and university earnings premiums are 17.2% and 52.7%, respectively, in the United States. Decomposed by the actual educational attainment, two patterns stand out. First, the predicted weekly earnings had the respondents did not receive any post-secondary education are increasing with actual educational attainment in the United States, while they are lowest for college graduates in Canada. Although the estimates are not statistically significantly different from each other, the results parallel the findings from Caponi and Plesca (2001). Second, the college premium for American university graduates is lower than for their college or high school graduate counterparts.

The rightmost four columns of Tables 5 and 6 show the estimates when job characteristics are included in the model. The earnings premium for university education drops significantly in both countries. The college earnings premium in the United States drops from 17.2% to 12.8% if job characteristics are controlled for. However, Canadian college earnings premium increases from 7.2% to 9.13% once job characteristics are conditioned on. The regression coefficients presented in Tables A1 and A2 indicate that the earnings premia for the professional, technical and kindred, managers, and officials and proprietors occupations are similar across education levels in United States. The Canadian earnings premia for these occupations are small to community college graduates. Since most community college graduates in Canada are not in these occupations (Table 3), they would not have benefited from university education if they kept their occupations. Because community college graduates in Canada are also less likely to be in clerical occupations (Table 3) which earn significantly less than other occupations (Table A1), community college graduates in Canada have an incentive to go to college conditional on their occupational choice.

Mean predicted earnings and premia from the BCG models appear in Tables 7 and 8. Comparing

[22]The bootstrapped standard errors do not change materially by varying 400 repetitions to more repetitions. The seed for Stata do-file is 654321.

the mean predicted earnings for the BCG estimates in Table 7 to the corresponding values from the benchmark model presented in Table 5, there is not much change for the Canadian sample, while college and university graduates in United States are observably better performers in the labour market even without higher education. The positive selection of American workers into colleges and universities is reflected in the estimated earnings premia. The average university earnings premium drops from 52.7% to 45.7% while the college earnings premium drops to 14.18%. The university earnings premium drops only slightly while the earnings premium of college education increases slightly in Canada compared to estimates from the benchmark. Without conditioning on job characteristics, the ratios of the college earnings premium to the university earnings premium are 0.26 and 0.31 in Canada and the United States respectively. Conditional on job characteristics, the college earnings premium in Canada is 0.72 of the university earnings premium, while the corresponding value is 0.43 in the United States.

Three interesting results emerge from the BCG estimates. First, the estimated mean earnings effect of college education for university educated workers in the United States is very low at 1.2%. Second, conditional on job characteristics, the Canadian college earnings premium and the university earnings premium of those attending colleges are very close at 11%. In other words, university education in Canada has no marginal benefit for persons in jobs typical of community college graduates. Third, if variables in Model CC, CD, UC and UD are sufficient to capture the non-random selection of education, earnings effect of community colleges conditional on job characteristics in Canada is relatively high. This is consistent to the explanation of popularity of community colleges in Canada by human capital theory.

The first stage of Lee's trinomial selection bias correction model appears in Tables A5 and A7. The estimates from the selection equation reveal another interesting result. American families with more educated parents have children receiving more education. However, it appears that people with more educated parents in Canada are more likely to attend university only. Parents' educational attainment does not have a positive effect on the incidence of college education in Canada.

Mean predicted earnings and premia from the Trost and Lee (1984) model are presented in Tables 9 and 10. Notice that the results of Americans from this model are very similar to that of the BCG estimates, while the earnings and wage premiums of Canadians are closer to the OLS estimates. Tables A6 and A8 contain the second stage estimates of the Trost and Lee (1984) model. In Canadian sample, none of the coefficients of the selection correction terms are rejected[23]. The estimated coefficients of correlation of selection are large at -0.24 to -0.29 for college graduates in Canada.[24] It means that less

[23]Notice that the estimates from 2-stage method is not as efficient as full information maximum likelihood estimation. Also, bootstrap standard errors are used.

[24] Full information maximum likelihood estimation show statistically significant negative selection for college graduates in

productive workers are more likely to attend college in Canada. However, it is statistically significant that less productive workers are less likely to take higher education in the United States, and there is some evidence that the most productive workers choose to attend university. Assume that educational attainment of parents are valid instruments, Hausman tests of the exogeneity do not reject the validity of the other instruments.

In summary, the estimated earnings premium for different education levels, with and without conditioning on job characteristics, from the various models show several consistent implications. First, it seems that self-selection in Canada is not as serious as in United States. At least, less productive Canadians are more likely to attend colleges, while the more productive Americans get more education. Second, the functions of community colleges and universities in enhancing productivity may be different in Canada and in United States. Colleges and universities in Canada have their own specialization to enhance different specific human capital, evident by the very difference in earnings premia of occupations. Colleges and universities in United States enhance similar human capital to different amount because of the similar earnings premium of occupations. Finally, Canadians have stronger incentives to choose college over university conditional on several job characteristics including occupation.

5.2 Factors affecting educational choice

Using the predicted earnings values from the Trost and Lee (1984) model, (4) can be estimated as a multinomial logit model. Variables denominated in American dollars are multiplied by 1.37 to convert to Canadian dollars.[25] In the model, gross returns to college and universities are measured by the estimated college and university earnings premia. Predicted earnings as a high school graduate are also included to capture the earnings forgone by attending college or university. Interactions of the estimated premia and predicted high school earnings are also included in order to study the possible selection effects. Variables available in both samples are included in the estimation. These variables include parents' educational attainments, real college tuition or fees, real university tuition or fees, an indicator for blacks and the national unemployment rate in the year of program entrance. Tables 11 and 12 show the results of this estimation. Marginal effects are also presented, although the standard errors of the marginal effects are not estimated because of the time consuming complex algorithm required to do so.

In both Tables 11 and 12, the left four columns report estimates using predicted values from models that do not condition on job characteristics. The last four columns show estimates using predicted values from Models CB and UB. As discussed above, the earnings effects of education estimated by

---

Canada.

[25] 1.37 is the average nominal exchange rate in 1996.

Models CA and UA also contain any causal effects of educational choice on occupation. Both Table 11 and Table 12 show that the propensity of attending community college is decreasing in the college premium without conditioning on job characteristics. However, the propensity of attending college is increasing in the college premium and decreasing in the university premium conditional on job characteristics. The propensity to attend university also increases in the university premium and decreases in the college premium conditional on job characteristics.

Parents' educational attainment show similar effects as in the reduced form estimation. In the United States, workers with more educated parents pursue more education. In Canada, parents' educational attainments have a positive effect on the probability of university attendance. However, people with less educated parents are more likely to obtain a college education.

Educational choice is also insensitive to college and university fees. In Canada, every 100 Canadian dollar increase in university tuition will increase propensity of college attendance by 1.74 percentage points and decrease propensity of university attendance by 1.38 percentage points. These estimates are larger than those in existing literature[26] . The estimated partial elasticities of college and university attendance to college tuition are smaller and statistically insignificant in Canada. All estimated partial elasticities of college and university attendance are also small and insignificant in American sample.

There is no clear relation of unemployment rates to educational choice. The effects of the national unemployment rate in Canada are small and insignificant, while the effects in the United States are counterintuitive if earnings effects of education do not condition on job characteristics.

How well does the difference in earnings effects of education conditional on job characteristics explain the difference in educational choice between Canada and the United States? One way to answer this question is by asking "how would Canadians choose if they are endowed with the American returns to education?" and "how would Americans choose if they are endowed with Canadian returns to education?" Table 13 contains the predicted choice probabilities obtained using the models in Tables 11 and 12, as well as a simplified model that includes only predicted earning.

The upper half of Table 13 presents predicted probabilities from the simplified multinomial logit model using predicted earnings only. The three figures in upper left block shows that if Canadians were endowed with the American returns to education, the probability of choosing community college is 42.86% and the probability of choosing university is 39.66%. In other words, Canadians would go to college more than Americans and to university less than Americans, even if they faced American returns

[26]The corresponding partial elasticities of USD100 increase in tuition are 2.38 percentage points increase in community college participation and 1.87 percentage points decrease in university participation. These are even larger than those in Rouse (1995)

to education. Compared to the actual Canadian proportions of attending college and university at 55.31% and 26.61% respectively, the difference in returns to education between Canada and the United States explain a substantial part of the educational choice. Because the only factors considered in this simplified model are the returns to college and university education, the results demonstrate that Canadians do have a stronger incentive to choose college.

The upper right block shows the probabilities if the exercise is repeated to show how Americans would choose if they were endowed with Canadian returns to education. It is surprising to see that there is not much change in the probability of choosing college. However, the probability of Americans choosing university drops from 27.59% to 22.7% if they endowed with Canadian returns to education. This result suggests that it may be the low return to Canadian university education that contributes to the popularity of community colleges.

If we repeat this simulation exercise using the complete model shown in Tables 11 and 12, the results show a drop in the probability of choosing high school education only for Canadians endowed with American returns to education, tuition level, parents' educational attainment, race and unemployment rate. The probabilities of choosing colleges and universities are levelled at around 47%. The larger increase in probability of choosing university shows that factors other than returns to education in Canada are not favourable for university education, compared to the United States. Similarly, the probability of choosing university if Americans were endowed with Canadians' characteristics drops to 19.67%.

6. Conclusions

In summary, this study finds that Canadians do have stronger incentives to attend community colleges rather than universities than Americans do. Previous studies assumed that human capital acquired from different post-secondary institutions is homogenous. This assumption is acceptable in the United States but it is questionable in Canada. Results from this study show that Canadian universities and colleges are specialize in different types of human capital. At least, the Canadian universities and colleges place their graduates in rather distinct career paths.

If occupational difference in earnings is compensating the less desirable characteristics of the job, conditioning on occupation is important to estimate comparable earnings effects of education. On the other hand, if educational and occupational choices are jointly endogenous, estimated earnings effects of education from models with and without conditioning on occupation could be biased. If occupation is determined by the choice of education, the occupational earnings premium should also be considered as a returns to education. However, occupational choice is usually associated with other unobserved

characteristics. These unobserved characteristics may predetermine the occupational choice and education is just a mean to achieve a particular career path. Thus, the earnings premiums of education are biased without any control for this career choice. It is conceptually possible to model the simultaneous choice of occupation and education; however, it is very difficult in practice to find instruments or structure to identify the actual return to education. This paper takes another approach by presenting results from models that do and do not condition on job characteristics, such as occupation. The results show that estimated returns to education in Canada are sensitive to specification.

This study also finds that difference in tuition and in parents' educational attainments also contributes some of the difference in educational choice between Canada and the United States. The results in this study confirm that tuition level is not a major factor in educational choice. Earnings effects of education conditional on job characteristics explain a significant portion of the popularity of colleges in Canada compared to the United States. Tuition level, parents' educational attainment, race and unemployment rate in Canada are not favourable to the choice of university. However, the factors considered in this study cannot explain the lower participation in higher education of Americans. It may be institutional difference such as difference in supply of public higher education.

Using various instruments, I also find that the self-selection on unobservables into different types of education institutions is different in Canada and in the United States. There is positive selection in the United States, with better workers more likely to have higher educational attainment. Less able workers in Canada choose to attend colleges, while more able workers choose to have high school education only or to go to university. It is possible that there are fewer barriers to higher education in Canada then in the United States. It is also possible that the selection processes in the two countries differ in ways that the instruments applied to Canadian data failed to identify. The results from this study favour the former explanation. First, the choice of college education is insensitive to the estimated return to college education in the United States. Also, given that returns to education in Canada are absolutely lower than returns in the United States, the higher proportion of Canadians receiving higher education suggest that the costs of acquiring higher education other than tuition are lower[27]. Furthermore, if the government's objective of establishing community colleges is to help workers with lower productivity, it is well targeted.

[27]Other costs include the forgone earnings, transportations and accomodataions, costs of financing, etc.

References

[1] Barnow, Burt S., Cain, Glen G. and Goldberger, Arthur S. (1980): "Issues in the Analysis of Selectivity Bias," in Ernst W. Stromsdorfer and George Farkas (eds), Evaluation Studies Review Annual, Volume 5, Beverly Hills, CA.: Sage Publications, 43-59.

[2] Bar-Or, Yuval; Burbidge, John; Magee, Lonnie and A Leslie Robb (1995) "The Wage Premium to a University Education in Canada, 1971-1991" *Journal of Labor Economics*, 13(4)

[3] Caponi, Vincenzo and Miana Plesca (2000) "The choice for higher education in Canada: a comparison of returns from high school, community college and university." unpublished manuscript.

[4] Card, David (1999) "The Causal Effect of Education on Earnings" in Orley Ashenfelter and David Card (eds.) *Handbook of Labor Economics*, Volumn 3a, Elsevier Science B.V., 1802-1860

[5] Ferrer, Ana and W. Craig Riddell (2002) "The Role of Credentials in the Canadian Labour Market," *Canadian Journal of Economics*, 35(4), 879-905.

[6] Garen, John (1984) "The returns to schooling: a selectivity bias approach with a continuous choice variable," Econometrica 52(3), 1199-218

[7] Gill, Andrew M. and Duane E. Leigh (forthcoming) "Do the Labor Market Payoffs to Community Colleges Differ Between Transfer and Terminal Training Programs? " *Journal of Human Resources*, forthcoming.

[8] Grubb, W. Norton (1993) "The Varied Economic Returns to Post-secondary Education: New Evidence from the Class of 1972." *Journal of Human Resources*, 28(2).

[9] Hearn, James C. and David Longanecker (1985) "Enrolment Effects of Alternative Post-secondary Pricing Policies." *Journal of Higher Education*, 56(5), 485-508.

[10] Heckman, James J (1979) "Sample Selection Bias as a Specification Error." Econometrica, 47(1). 153-161.

[11] Heckman, James J, Lalonde, Robert and Smith, Jeffrey A (1999): "The Economics and Econometrics of Active Labor Market Programs," in Orley Ashenfelter and David Card (eds.) *Handbook of Labor Economics*, Volumn 3a, Elsevier Science B.V., 1866-2097.

[12] Heckman, James J., Lochner, Lance and Christopher Taber (1988) "General Equilibrium Treatment Effects: A Study of Tuition Policy." *American Economic Review*, 88(2).

[13] Kane, Thomas J (2000) "Rising Public College Tuition and College Entry: How Well Do Public Subsidies Promote Access to College." National Bureau of Economic Research, Working Paper 5164, Cambridge, Massachusetts.

[14] Kane, Thomas J. and Cecilia E. Rouse (1993) "Labor Market Returns to Two- and Four-Year Colleges: Is a Credit a Credit and Do Degrees Matter? " National Bureau of Economic Research, Working Paper No. 4268, Cambridge, Massachusetts.

[15] Kane, Thomas J. and Cecilia E. Rouse (1995) "Labor Market Returns to Two- and Four-Year College." *American Economic Review*, 85(3), 600-14.

[16] Kane, Thomas J. and Cecilia E. Rouse (1999) "The Community College: Educating Students at the Margin Between College and Work." *Journal of Economic Perspectives*, 13(1), 63-84.

[17] Lee, Lung-Fei (1983) "Generalized Econometric Models with Selectivity," *Econometrica*, 51(2), 507-512.

[18] Leigh, Duane E. and Andrew M. Gill (1997) "Labor Market Returns to Community Colleges: Evidence for Returning Adults" *Journal of Human Resources*, 32(2), 334-53

[19] Leslie, Larry L. and Paul T. Brinkman (1987) "Student Price Response in Higher Education: The Student Demand Studies," *Journal of Higher Education*, 58(2), 181-204.

[20] Levin, B (1990) "Tuition Fees and University Accessibility." *Canadian Public Policy*, 16(1).

[21] Pearman, Noel (2001) "Why University? Examining the Determinants of the Choice For Higher Education: Canada and the United States," unpublished manuscript.

[22] Rouse, Ceilia E (1995) "Democratization or Diversion: The Effect of Community Colleges on Educational Attainment." *Journal of Business and Economic Statistics*, 13(2): 217-24.

[23] Trost, Robert P., and Lung-Fei Lee (1984) "Technical Training and Earnings: A Polychotomous Choice Model with Selectivity." *Review of Economics and Statistics*, 66(1): 151-56.

[24] National Center for Education Statistics (1989 - 1996): Digest of Education Statistics, 1989 - 1996. Washington, D.C. US. Department of Education.

[25] Willis, Robert and Sherwin Rosen (1979) "Education and Self-Selection." *Journal of Political Economy*, 87(5).

Table 1
Sample Used

Canada - Survey of Labour and Income Dynamics 1996

	Men
Total Number of Observations	2909
Observations with Positive Main Job Hourly Wage	2476
Observations with Positive Main Job Weekly Earningss	2452

United States - National Longitudinal Survey of Youth 1979

	Men
Total Number of Observations	3158
Observations with Positive Main Job Hourly Wage	3055
Observations with Positive Main Job Weekly Earningss	3054

Table 2
Summary Statistics

	SLID	NLSY
Usual Hourly Wage	18.75	15.79
	(7.52)	(11.97)
Log Usual Hourly Wage	2.85	2.56
	(0.42)	(0.64)
Usual Weekly Earningss	832.06	706.09
	(368.88)	(620.69)
Log Usual Weekly Earningss	6.62	6.32
	(0.50)	(0.71)
Employed	0.98	0.95
	(0.15)	(0.22)
High School Graduates	0.17	0.62
	(0.38)	(0.48)
Community College Graduates	0.61	0.14
	(0.49)	(0.35)
University Graduates	0.21	0.23
	(0.41)	(0.42)
Entrance Year	1983.01	1979.5
	(5.30)	(2.99)
Potential Working Experience (Years)	14.04	15.32
	(3.87)	(3.03)
Live in Urban Area (1996)	0.76	0.80
	(0.43)	(0.40)
Live in Consolidated CMA (1996)	0.03	N/A
	(0.18)	
Live in Regular CMA (1996)	0.04	N/A
	(0.18)	
Live in Consolidated CA (1996)	0.02	N/A
	(0.15)	
Live in Regular CA (1996)	0.59	N/A
	(0.49)	
Live Outside CMA or CA (1996)	0.32	N/A
	(0.47)	
Live Outside SMSA in 1996	N/A	0.18
		(0.38)
Live in SMSA (Not Central City) 1996	N/A	0.38
		(0.48)
Live in SMSA (Central City Unknown) 1996	N/A	0.28
		(0.45)
Live in SMSA (in Central City) 1996	N/A	0.15
		(0.35)
SMSA Information at 1996 Missing	N/A	0.01
		(0.12)

Note: Standard deviations are shown in parentheses. All estimates are unweighted sample values.

Table 2 (continued)
Summary Statistics

	SLID	NLSY
Aboriginal	Suppressed	0.01 (0.12)
Missing Aboriginal Status	Suppressed	0.02 (0.13)
Hispanic	N/A	0.16 (0.37)
Black	Suppressed	0.29 (0.45)
Non-English First Language	0.27 (0.45)	N/A
Union Member	0.30 (0.46)	0.18 (0.38)
Union Membership Missing	0.16 (0.36)	0.00 (0.06)
Covered by Collective Agreements	0.03 (0.17)	0.03 (0.41)
Working Full Time (More than 30 hours/week)	0.96 (0.20)	0.95 (0.21)
Occupation: Professional,Technical and Kindred	0.19 (0.39)	0.16 (0.37)
Occupation: Managers, Officials and Properietors	0.16 (0.36)	0.16 (0.37)
Occupation: Clerical and Kindred	0.03 (0.18)	0.07 (0.25)
Occupation: Sales	0.07 (0.26)	0.05 (0.21)
Employer Size: 0-19	0.43 (0.49)	0.36 (0.48)
Employer Size: 20-99	0.27 (0.44)	0.26 (0.44)
Employer Size: 100-499	0.18 (0.39)	0.19 (0.39)
Employer Size: 500-999	0.06 (0.24)	0.06 (0.23)
Employer Size: More than 1000	0.06 (0.24)	0.10 (0.30)
Employer Size Missing	0.00 (0.06)	0.03 (0.18)
Job Tenure	8.25 (5.89)	5.25 (4.92)
Real Average Community College Fees / Tuition	802.85 (527.47)	856.55 (420.07)
Real Average University Fees / Tuition	1993.08 (470.01)	1534.62 (575.26)
Average Community College Fees Missing	0.07 (0.25)	0.31 (0.46)
Average University Fees Missing	0.01 (0.07)	0.04 (0.19)

Note: Standard deviations are shown in parentheses. All estimates are unweighted sample values.
Statistics from variables of ethnicity are suppressed to protect privacy as suggested by Statistics Canada.

Table 2 (continued)
Summary Statistics

	SLID	NLSY
Overall Unemployment Rate:	9.14	7.39
Entrance Year	(1.75)	(1.23)
Youth Unemployment Rate:	14.77	18.67
Entrance Year	(2.46)	(2.22)
Proximity: University within 50km	0.42	N/A
	(0.49)	
Proximity: College within 50km	0.60	N/A
	(0.49)	
Proximity Missing	0.13	N/A
	(0.34)	
Father's Educational Attainment	0.42	0.42
Some High School or Graduate	(0.49)	(0.49)
Father's Educational Attainment	0.08	0.09
Some Postsecondary	(0.28)	(0.29)
Father's Educational Attainment	0.04	0.15
Bachelor Degree or More	(0.21)	(0.35)
Father's Education: Missing	0.12	0.11
	(0.32)	(0.31)
Mother's Educational Attainment	0.49	0.57
Some High School or Graduate	(0.50)	(0.50)
Mother's Educational Attainment	0.12	0.10
Some Postsecondary	(0.32)	(0.30)
Mother's Educational Attainment	0.02	0.08
Bachelor Degree or More	(0.15)	(0.28)
Mother's Education: Missing	0.10	0.05
	(0.29)	(0.22)
Lived in Urban Area (1979)	N/A	0.76
		(0.42)
Live Outside SMSA in 1979	N/A	0.31
		(0.46)
Live in SMSA (Not Central City) 1979	N/A	0.27
		(0.44)
Live in SMSA (Central City Unknown) 1979	N/A	0.22
		(0.41)
Live in SMSA (in Central City) 1979	N/A	0.18
		(0.38)
SMSA Information in 1979 Missing	N/A	0.04
		(0.20)
Not Both Parent Present at Age 14	N/A	0.27
		(0.45)
Had only Mother at Age 14	N/A	0.15
		(0.35)
Parental Information Missing at Age 14	N/A	0.00
		(0.04)
Number of Sibling in 1979	N/A	3.55
		(2.48)
Sibling Information in 1979 Missing	N/A	0.00
		(0.03)

Note: Standard deviations are shown in parentheses. All estimates are unweighted sample values.

Table 3
Statistics by Highest Education Attained

	Canada			United States		
	High-school	College	University	High-school	College	University
Educational Attainment (%)	18.08 (1.09)	55.31 (1.43)	26.61 (1.34)	58.70 (1.03)	13.72 (0.71)	27.59 (0.95)
Usual Hourly Wages (CAD | USD)	18.46 (0.43)	18.46 (0.27)	23.72 (0.60)	13.96 (0.27)	17.30 (0.84)	23.93 (0.68)
Usual Weekly Wages (CAD | USD)	813.58 (22.89)	813.94 (12.14)	1047.62 (38.72)	630.48 (16.00)	756.28 (34.89)	1099.44 (34.24)
Employed (%)	97.2 (0.99)	98.05 (0.39)	98.14 (0.81)	94.84 (0.56)	95.38 (1.14)	97.82 (0.60)
Working Full Time (%)	93.20 (1.69)	96.59 (0.68)	90.72 (2.11)	95.67 (0.52)	94.97 (1.19)	97.39 (0.63)
Union Member (%)	34.96 (3.19)	30.01 (1.63)	21.45 (2.39)	20.98 (1.10)	17.95 (2.07)	8.50 (1.10)
Covered by Collective Agreements (%)	3.27 (1.34)	3.22 (1.66)	5.66 (1.74)	2.72 (0.42)	1.57 (0.61)	4.05 (0.82)
Job Tenure (Years)	9.48 (0.46)	8.49 (0.20)	7.57 (0.28)	5.78 (0.15)	5.05 (0.26)	5.63 (0.19)
Employer Size: 0-19 (%)	35.98 (3.09)	41.10 (1.73)	32.30 (2.77)	40.77 (1.32)	40.58 (2.75)	29.44 (1.88)
Employer Size: 20-99 (%)	28.09 (3.07)	26.82 (1.60)	27.31 (2.66)	25.85 (1.17)	25.59 (2.42)	24.19 (1.75)
Employer Size: 100-499 (%)	24.11 (3.07)	20.36 (1.52)	19.45 (2.43)	18.60 (1.03)	15.51 (2.00)	18.65 (1.57)
Employer Size: 500-999 (%)	4.32 (1.27)	6.01 (0.82)	8.71 (1.79)	4.51 (0.55)	8.26 (1.56)	8.14 (1.16)
Employer Size: More than 1000 (%)	7.49 (1.69)	5.25 (0.86)	10.90 (2.26)	6.71 (0.64)	7.73 (1.41)	17.17 (1.54)
Occupation: Professional,Technical and Kindred (%)	7.05 (1.61)	13.09 (1.24)	44.92 (3.04)	5.25 (0.61)	21.55 (2.30)	43.84 (2.03)
Occupation: Managers, Officials and Properietors (%)	13.70 (2.09)	12.32 (1.26)	30.67 (2.82)	14.16 (0.97)	22.48 (2.35)	27.68 (1.84)
Occupation: Clerical and Kindred (%)	8.06 (2.22)	5.85 (1.13)	2.42 (1.08)	6.12 (0.62)	5.75 (1.21)	5.13 (0.91)
Occupation: Sales (%)	14.89 (2.46)	6.76 (0.86)	7.68 (1.76)	3.06 (0.47)	5.24 (1.35)	10.27 (1.25)
Occupation: Others (%)	56.31 (3.33)	61.97 (1.80)	14.32 (2.13)	71.41 (1.23)	44.98 (2.76)	13.09 (1.38)

Note: Standard errors are shown in parentheses. All estimates are weighted sample values.

Table 4
List of Variables in Various Models

Canada

Model CA
Experience
Live in Urban Area
Live in Regular CMA (1996)
Live in Consolidated CA (1996)
Live in Regular CA (1996)
Live Outside CMA or CA (1996)
Aboriginal
Aboriginal Missing
Black
Non-English First Language

Model CB
Variables in Model CA and
Union Member
Union Membership Missing
Covered by Collective Agreements
Job Tenure
Employer Size: 20-99
Employer Size: 100-499
Employer Size: 500-999
Employer Size: More than 1000
Employer Size Missing
Occupation: Professional, Technical and Kindred
Occupation: Managers, Officials and Properietors
Occupation: Clerical and Kindred
Occupation: Sales

Model CC
Variables in Model CA and
Real Average Community College Fees
Real Average University Fees
Average Community College Fees Missing
Average University Fees Missing
Enter in Community College before 1983
Mother's Educational Attainment
Some High School or Graduate
Mother's Educational Attainment
Some Postsecondary
Mother's Educational Attainment
Bachelor Degree or More
Father's Educational Attainment
Some High School or Graduate
Father's Educational Attainment
Some Postsecondary
Father's Educational Attainment
Bachelor Degree or More
Mother's Education: Missing
Father's Education: Missing
Proximity: University within 50km
Proximity: College within 50km
Proximity Missing

Model CD
Variables in Model CB and
Real Average Community College Fees
Real Average University Fees
Average Community College Fees Missing
Average University Fees Missing
Enter in Community College before 1983
Mother's Educational Attainment
Some High School or Graduate
Mother's Educational Attainment
Some Postsecondary
Mother's Educational Attainment
Bachelor Degree or More
Father's Educational Attainment
Some High School or Graduate
Father's Educational Attainment
Some Postsecondary
Father's Educational Attainment
Bachelor Degree or More
Mother's Education: Missing
Father's Education: Missing
Proximity: University within 50km
Proximity: College within 50km
Proximity Missing

Table 4 (continued)
List of Variables in Various Models

United States

Model UA
Experience
Live in Urban (1996)
Urban Missing
SMSA (Not Central City) 1996
Live in SMSA (Central City Unknown) 1996
Live in SMSA (in Central City) 1996
SMSA Information at 1996 Missing
Aboriginal
Aboriginal Missing
Black
Hispanic

Model UB
Variables in Model UA
Union Member
Union Membership Missing
Covered by Collective Agreements
Job Tenure
Employer Size: 20-99
Employer Size: 100-499
Employer Size: 500-999
Employer Size: More than 1000
Employer Size Missing
Occupation: Professional, Technical and Kindred
Occupation: Managers, Officials and Properietors
Occupation: Clerical and Kindred
Occupation: Sales

Model UC
Variables in Model UA
Real Average Community College Tuition
Real Average University Tuition
Average Community College Tuition Missing
Average University Tuition Missing
Mother's Educational Attainment
Some High School or Graduate
Mother's Educational Attainment
Some Postsecondary
Mother's Educational Attainment
Bachelor Degree or More
Father's Educational Attainment
Some High School or Graduate
Father's Educational Attainment
Some Postsecondary
Father's Educational Attainment
Bachelor Degree or More
Mother's Education: Missing
Father's Education: Missing
Number of Sibling in 1979
Sibling Information in 1979 Missing
Not Both Parent Present at Age 14
Had only Mother at Age 14
Parental Information at Age 14 Missing

Model UD
Variables in Model UB
Real Average Community College Tuition
Real Average University Tuition
Average Community College Tuition Missing
Average University Tuition Missing
Mother's Educational Attainment
Some High School or Graduate
Mother's Educational Attainment
Some Postsecondary
Mother's Educational Attainment
Bachelor Degree or More
Father's Educational Attainment
Some High School or Graduate
Father's Educational Attainment
Some Postsecondary
Father's Educational Attainment
Bachelor Degree or More
Mother's Education: Missing
Father's Education: Missing
Number of Sibling in 1979
Sibling Information in 1979 Missing
Not Both Parent Present at Age 14
Had only Mother at Age 14
Parental Information at Age 14 Missing

Table 4 (continued)
List of Variables in Various Models

Instruments in Selection Equations

Canada	**United States**
Live in Urban (1996)	Lived in Urban Area (1979)
Live in Regular CMA (1996)	Live Outside SMSA in 1979
Live in Consolidated CA (1996)	Live in SMSA (Not Central City) 1979
Live in Regular CA (1996)	Live in SMSA (Central City Unknown) 1979
Live Outside CMA or CA (1996)	Live in SMSA (in Central City) 1979
Aboriginal	SMSA Information in 1979 Missing
Aboriginal Missing	Aboriginal Missing
Black	Black
Non-English First Language	Hispanic
Real Average Community College Fees	Real Average Community College Tuition
Real Average University Fees	Real Average University Tuition
Average Community College Fees Missing	Average Community College Tuition Missing
Average University Fees Missing	Average University Tuition Missing
Enter in Community College before 1983	Mother's Educational Attainment: Some High School or Graduate
Mother's Educational Attainment: Some High School or Graduate	Mother's Educational Attainment: Some Postsecondary
Mother's Educational Attainment: Some Postsecondary	Mother's Educational Attainment: Bachelor Degree or More
Mother's Educational Attainment: Bachelor Degree or More	Father's Educational Attainment: Some High School or Graduate
Father's Educational Attainment: Some High School or Graduate	Father's Educational Attainment: Some Postsecondary
Father's Educational Attainment: Some Postsecondary	Father's Educational Attainment: Bachelor Degree or More
Father's Educational Attainment: Bachelor Degree or More	Mother's Education: Missing
Mother's Education: Missing	Father's Education: Missing
Father's Education: Missing	Number of Sibling in 1979
Proximity: University within 50km	Sibling Information in 1979 Missing
Proximity: College within 50km	Not Both Parent Present at Age 14
Proximity Missing	Had only Mother at Age 14
	Parental Information at Age 14 Missing

Table 5
Mean Predicted Weekly Earningss from OLS Models

Canada (CAD)	**Model CA** Actual Educational Attainment				**Model CB** Actual Educational Attainment			
Mean Predicted Weekly Earnings	All	High-school	College	University	All	High-school	College	University
Graduated from High-school	708.26	717.96	701.83	715.02	729.33	732.56	698.57	791.09
	(34.71)	(31.05)	(29.72)	(55.52)	(35.71)	(25.98)	(30.03)	(73.23)
Graduated from College	759.11	758.23	749.09	780.54	779.96	778.44	758.41	825.78
	(13.23)	(13.97)	(12.06)	(19.73)	(19.74)	(20.91)	(18.20)	(30.94)
Graduated from University	957.85	978.50	956.61	946.42	861.58	871.10	815.21	951.50
	(42.67)	(60.74)	(50.27)	(40.38)	(44.59)	(72.22)	(55.87)	(32.59)

United States (USD)	**Model UA** Actual Educational Attainment				**Model UB** Actual Educational Attainment			
Mean Predicted Weekly Earnings	All	High-school	College	University	All	High-school	College	University
Graduated from High-school	533.26	522.73	533.61	555.50	577.83	536.18	584.46	663.14
	(10.24)	(9.59)	(11.58)	(21.58)	(14.07)	(9.38)	(17.42)	(34.89)
Graduated from College	634.67	656.65	626.60	591.91	669.79	662.48	651.79	694.28
	(26.31)	(34.83)	(25.66)	(32.07)	(28.67)	(35.88)	(29.01)	(48.93)
Graduated from University	900.88	895.47	901.36	912.16	774.94	700.14	783.06	930.05
	(37.21)	(48.77)	(35.63)	(24.22)	(30.52)	(39.34)	(33.61)	(25.02)

Notes: Bootstrap standard errors based on 400 replications appear in parentheses. All estimates are weighted.

Table 6
Mean Percentage Returns to Education from OLS Models

Canada	**Model CA** Actual Educational Attainment				**Model CB** Actual Educational Attainment			
	All	High-school	College	University	All	High-school	College	University
Earnings Premium of College	7.21	5.77	6.71	9.24	9.13	8.53	10.71	6.27
	(5.60)	(5.08)	(4.94)	(8.53)	(6.24)	(5.26)	(6.15)	(10.00)
Earnings Premium of University	30.20	31.02	30.96	28.05	16.70	16.90	15.85	18.32
	(6.44)	(7.08)	(6.34)	(9.33)	(7.53)	(8.60)	(8.54)	(10.06)

United States	**Model UA** Actual Educational Attainment				**Model UB** Actual Educational Attainment			
	All	High-school	College	University	All	High-school	College	University
Earnings Premium of College	17.20	22.68	16.08	6.11	12.84	18.59	8.98	2.51
	(4.21)	(5.10)	(4.31)	(6.80)	(4.15)	(5.08)	(4.46)	(7.98)
Earnings Premium of University	52.74	54.19	52.69	49.67	29.18	27.48	28.41	33.21
	(4.65)	(5.83)	(4.51)	(4.59)	(4.95)	(6.11)	(5.20)	(5.61)

Notes: Bootstrap standard errors based on 400 replications appear in parentheses. All estimates are weighted.

Table 7
Mean Predicted Weekly Earningss from BCG Models

Canada (CAD)	**Model CC** Actual Educational Attainment				**Model CD** Actual Educational Attainment			
Mean Predicted Weekly Earnings	All	High-school	College	University	All	High-school	College	University
Graduated from High-school	717.45	722.31	713.07	723.27	734.08	736.72	704.81	793.11
	(48.09)	(28.57)	(55.31)	(70.53)	(51.54)	(24.86)	(51.97)	(95.09)
Graduated from College	768.41	797.38	753.29	780.17	788.21	800.54	762.87	832.53
	(13.33)	(17.97)	(11.84)	(21.96)	(19.61)	(22.80)	(18.08)	(31.61)
Graduated from University	962.44	1018.12	948.36	953.88	851.93	886.96	793.87	948.81
	(42.58)	(67.19)	(51.53)	(37.80)	(46.06)	(77.83)	(58.95)	(32.50)

United States (USD)	**Model UC** Actual Educational Attainment				**Model UD** Actual Educational Attainment			
Mean Predicted Weekly Earnings	All	High-school	College	University	All	High-school	College	University
Graduated from High-school	555.08	525.31	559.40	616.28	591.35	537.50	598.41	702.41
	(14.33)	(9.74)	(16.74)	(37.39)	(16.67)	(9.55)	(20.28)	(44.80)
Graduated from College	639.13	648.34	631.27	623.45	674.97	664.81	655.36	706.32
	(29.48)	(43.07)	(26.17)	(43.04)	(31.63)	(43.03)	(29.67)	(56.05)
Graduated from University	875.97	856.58	867.08	921.63	767.36	688.51	763.50	937.04
	(38.39)	(51.77)	(36.30)	(25.18)	(31.90)	(42.47)	(33.68)	(25.73)

Notes: Bootstrap standard errors based on 400 replications appear in parentheses. All estimates are weighted.

Table 8
Mean Percentage Returns to Education from BCG Models

Canada	**Model CC** Actual Educational Attainment				**Model CD** Actual Educational Attainment			
	All	High-school	College	University	All	High-school	College	University
Earnings Premium of College	7.73	10.60	6.23	8.88	10.23	11.27	11.09	7.74
	(6.63)	(5.17)	(6.99)	(10.09)	(6.78)	(5.31)	(6.96)	(11.42)
Earnings Premium of University	29.40	34.32	28.44	28.06	14.22	17.39	11.40	17.95
	(7.74)	(7.13)	(8.69)	(10.82)	(8.54)	(8.76)	(9.94)	(11.48)

United States	**Model UC** Actual Educational Attainment				**Model UD** Actual Educational Attainment			
	All	High-school	College	University	All	High-school	College	University
Earnings Premium of College	14.18	20.78	12.02	1.21	11.09	17.93	6.92	-1.41
	(4.86)	(6.32)	(4.77)	(9.09)	(4.72)	(6.18)	(4.82)	(9.43)
Earnings Premium of University	45.71	48.85	43.92	39.92	25.56	25.10	23.28	27.68
	(4.83)	(6.02)	(4.96)	(6.31)	(5.11)	(6.34)	(5.54)	(6.49)

Notes: Bootstrap standard errors based on 400 replications appear in parentheses. All estimates are weighted.

Table 9
Mean Predicted Weekly Earningss from Trost and Lee (1984) Models

Canada (CAD)	**Model CA** Actual Educational Attainment				**Model CB** Actual Educational Attainment			
Mean Predicted Weekly Earnings	All	High-school	College	University	All	High-school	College	University
Graduated from High-school	696.59	718.16	687.17	701.51	730.00	732.54	699.34	792.01
	(39.91)	(30.44)	(39.67)	(62.44)	(43.75)	(25.13)	(42.11)	(81.21)
Graduated from College	764.10	767.33	749.53	792.18	783.92	787.04	758.00	835.66
	(12.44)	(14.91)	(11.28)	(21.63)	(18.49)	(20.82)	(16.56)	(31.75)
Graduated from University	960.19	982.41	959.42	946.68	860.38	869.01	813.75	951.44
	(42.45)	(64.16)	(50.09)	(39.36)	(48.67)	(78.90)	(60.15)	(33.21)

United States (USD)	**Model UA** Actual Educational Attainment				**Model UB** Actual Educational Attainment			
Mean Predicted Weekly Earnings	All	High-school	College	University	All	High-school	College	University
Graduated from High-school	544.34	523.41	549.01	586.56	583.06	536.42	591.27	678.22
	(11.66)	(9.93)	(14.62)	(25.50)	(13.98)	(9.39)	(18.65)	(34.35)
Graduated from College	636.10	658.82	626.61	592.48	672.82	667.00	651.84	695.62
	(32.89)	(45.14)	(25.10)	(31.80)	(28.44)	(39.11)	(26.98)	(43.52)
Graduated from University	874.04	853.89	881.86	913.03	763.07	681.94	773.77	930.37
	(41.30)	(54.83)	(39.87)	(24.04)	(33.58)	(43.84)	(36.22)	(24.43)

Notes: Bootstrap standard errors based on 400 replications appear in parentheses. All estimates are weighted.

Table 10
Mean Percentage Return to Education from Trost and Lee (1984) Models

Canada	**Model CA** Actual Educational Attainment				**Model CB** Actual Educational Attainment			
	All	High-school	College	University	All	High-school	College	University
Earnings Premium of College	9.53	6.94	8.91	12.59	9.49	9.66	10.51	7.27
	(5.94)	(4.75)	(5.90)	(9.18)	(6.06)	(4.92)	(5.90)	(10.58)
Earnings Premium of University	32.15	31.41	33.42	30.03	16.45	16.64	15.55	18.19
	(7.37)	(7.74)	(7.90)	(9.66)	(8.10)	(9.58)	(9.16)	(10.46)

United States	**Model UA** Actual Educational Attainment				**Model UB** Actual Educational Attainment			
	All	High-school	College	University	All	High-school	College	University
Earnings Premium of College	15.67	22.98	13.52	1.20	12.54	19.25	7.88	0.59
	(4.80)	(6.22)	(4.32)	(6.90)	(4.30)	(5.77)	(4.29)	(7.68)
Earnings Premium of University	47.92	49.46	47.90	44.64	26.79	24.91	26.19	31.08
	(5.02)	(6.55)	(4.80)	(4.73)	(5.15)	(6.66)	(5.19)	(5.43)

Notes: Bootstrap standard errors based on 400 replications appear in parentheses. All estimates are weighted.

Table 11
Multinomial Logit Model of Educational Choice - Canada

	Unconditional to Job Characteristics				Conditional to Job Characteristics			
	Coefficients		Marginal Effects		Coefficients		Marginal Effects	
Choice	College	University	College	University	College	University	College	University
Predicted Earnings (High-school) / 10	0.17	0.11	2.47	-0.61	0.00	0.04	-0.67	0.77
	(0.08)**	(0.09)			(0.01)	(0.01)***		
College Earnings Premium / 10	0.23	0.55	-2.66	6.49	0.02	-0.03	1.06	-0.96
	(0.17)	(0.18)***			(0.02)	(0.03)		
University Earnings Premium / 10	0.58	-0.04	14.20	-9.30	0.01	0.04	-0.44	0.65
	(0.23)**	(0.23)			(0.03)	(0.04)		
College x	-1.02	-0.89	-10.77	-1.08	0.00	0.04	-0.63	0.78
University Premium / 10,000	(0.37)***	(0.30)***			(0.06)	(0.08)		
High-school Earnings x	0.00	0.00	0.02	-0.02	-0.03	0.06	-1.74	1.67
College Premium / 10,000	(0.00)	(0.00)			(0.02)	(0.03)**		
High-school Earnings x	-0.77	0.01	-18.24	11.51	-0.02	-0.03	0.04	-0.31
University Premium / 10,000	(0.30)**	(0.29)			(0.04)	(0.04)		
Father's Educational Attainment	0.01	0.19	-2.52	3.29	0.08	0.35	-3.40	5.37
Some High School or Graduate	(0.19)	(0.26)			(0.19)	(0.26)		
Father's Educational Attainment	0.12	0.36	-2.75	4.96	0.18	0.72	-7.79	11.78
Some Postsecondary	(0.34)	(0.41)			(0.34)	(0.40)*		
Father's Educational Attainment	0.44	0.76	-2.38	7.74	0.49	1.74	-21.51	30.35
Bachelor Degree or More	(0.51)	(0.56)			(0.49)	(0.48)***		
Mother's Educational Attainment	-0.01	-0.07	0.76	-1.09	-0.08	-0.12	-0.24	-0.90
Some High School or Graduate	(0.21)	(0.28)			(0.20)	(0.28)		
Mother's Educational Attainment	0.34	0.33	2.87	0.83	0.11	0.48	-5.18	7.79
Some Postsecondary	(0.30)	(0.38)			(0.30)	(0.36)		
Mother's Educational Attainment	-1.01	-1.02	-12.01	-4.75	-1.16	-0.43	-22.32	7.72
Bachelor Degree or More	(0.62)	(0.68)			(0.66)*	(0.65)		
Father's Education: Missing	-0.05	0.29	-5.60	6.22	-0.01	1.05	-18.51	22.80
	(0.33)	(0.40)			(0.34)	(0.41)**		
Mother's Education: Missing	0.50	0.32	6.65	-1.88	0.40	-0.28	12.65	-9.89
	(0.40)	(0.53)			(0.37)	(0.51)		
Real Average Community	0.00	0.00	0.00	0.00	-0.02	-0.03	0.07	-0.35
College Fees / 100	(0.00)	(0.00)			(0.02)	(0.02)		
Real Average University	0.00	0.00	0.00	0.01	0.05	-0.03	1.74	-1.38
Fees / 100	(0.00)***	(0.00)***			(0.03)**	(0.03)		
Average Community College Fees Missing	0.07	0.35	-3.82	5.57	0.03	-0.05	1.49	-1.37
	(0.28)	(0.32)			(0.27)	(0.33)		
Average University Fees Missing	-0.29	-0.05	-6.29	3.47	-0.33	0.77	-21.45	22.88
	(0.99)	(1.00)			(0.93)	(0.93)		
Enter in Community College before 1983	-1.70	-1.80	-12.94	-7.26	-1.78	-2.44	-5.12	-18.28
	(0.25)***	(0.28)***			(0.24)***	(0.27)***		
Unemployment Rate	0.04	0.01	0.71	-0.35	0.04	0.07	-0.02	0.61
	(0.06)	(0.07)			(0.06)	(0.07)		
Constant	-12.49	-9.02			1.38	-1.31		
	(6.15)**	(6.72)			(0.91)	(1.11)		
Observations	2909				2909			
Pseudo R-squared	0.1604				0.139			
Log Likelihood	-2415.6				-2477.4			

Robust standard errors appear in parentheses. All estimates are weighted. The columns of marginal effects represent the change in percentage points.
* significant at 10%; ** significant at 5%; * significant at 1%
Statistics from variables of ethnicity are suppressed to protect privacy as suggested by Statistics Canada.

Table 12
Multinomial Logit Model of Educational Choice - United States

	Unconditional to Job Characteristics				Conditional to Job Characteristics			
	Coefficients		Marginal Effects		Coefficients		Marginal Effects	
Choice	College	University	College	University	College	University	College	University
Predicted Earnings (High-school) / 10	-0.01	0.08	-0.35	1.08	0.02	0.06	0.13	0.88
	(0.03)	(0.08)			(0.01)***	(0.01)***		
College Earnings Premium / 10	-0.22	-0.52	-1.82	-6.11	0.02	0.02	0.20	0.21
	(0.06)***	(0.10)***			(0.01)	(0.01)		
University Earnings Premium / 10	-0.08	-0.01	-1.21	0.10	0.01	0.07	-0.16	1.10
	(0.05)	(0.12)			(0.02)	(0.02)***		
College x	-0.21	-0.37	-2.15	-4.24	-0.01	0.01	-0.21	0.16
University Premium / 10,000	(0.09)**	(0.31)			(0.02)	(0.02)		
High-school Earnings x	0.00	0.01	0.03	0.06	-0.04	-0.06	-0.37	-0.82
College Premium / 10,000	(0.00)***	(0.00)***			(0.01)***	(0.01)***		
High-school Earnings x	0.07	-0.08	1.18	-1.16	0.01	-0.04	0.26	-0.66
University Premium / 10,000	(0.06)	(0.15)			(0.02)	(0.02)**		
Black	2.15	3.88	3.38	60.44	0.43	0.46	4.67	6.22
	(0.38)***	(0.60)***			(0.17)**	(0.19)**		
Father's Educational Attainment	0.04	-0.19	1.18	-2.60	0.15	0.08	1.84	0.83
Some High School or Graduate	(0.19)	(0.21)			(0.18)	(0.20)		
Father's Educational Attainment	0.03	-0.36	1.44	-4.29	0.46	0.86	2.66	14.42
Some Postsecondary	(0.27)	(0.28)			(0.26)*	(0.25)***		
Father's Educational Attainment	0.12	-0.66	3.41	-7.65	0.77	1.39	4.15	23.41
Bachelor Degree or More	(0.32)	(0.32)**			(0.27)***	(0.25)***		
Mother's Educational Attainment	0.09	0.00	1.29	-0.25	0.22	0.37	1.80	5.24
Some High School or Graduate	(0.21)	(0.24)			(0.20)	(0.22)*		
Mother's Educational Attainment	0.16	-0.44	3.69	-5.42	0.70	1.03	5.38	16.40
Some Postsecondary	(0.30)	(0.33)			(0.28)**	(0.27)***		
Mother's Educational Attainment	0.15	-0.67	4.04	-7.48	0.91	1.36	6.30	22.25
Bachelor Degree or More	(0.35)	(0.41)*			(0.35)***	(0.33)***		
Father's Education: Missing	0.07	-0.49	2.32	-5.60	0.27	-0.03	4.38	-1.50
	(0.26)	(0.32)			(0.26)	(0.32)		
Mother's Education: Missing	-0.31	0.14	-4.57	2.75	-0.55	-0.65	-5.30	-7.93
	(0.36)	(0.44)			(0.36)	(0.44)		
Real Average Community	0.00	0.00	0.00	0.00	0.00	-0.01	0.03	-0.21
College Fees / 100	(0.00)	(0.00)			(0.02)	(0.02)		
Real Average University	0.00	0.00	0.00	0.00	0.02	0.02	0.29	0.16
Fees / 100	(0.00)	(0.00)*			(0.01)*	(0.01)		
Average Community College Fees Missing	0.79	2.20	2.95	32.01	-0.33	-0.90	-1.72	-12.75
	(0.27)***	(0.29)***			(0.17)*	(0.18)***		
Average University Fees Missing	-0.24	-0.92	-1.62	-8.45	0.22	0.14	2.81	1.43
	(0.37)	(0.45)**			(0.36)	(0.42)		
Unemployment Rate	-0.12	-0.36	-0.85	-4.31	0.00	-0.01	0.12	-0.24
	(0.06)**	(0.06)***			(0.05)	(0.05)		
Constant	2.28	1.62			-4.34	-6.95		
	(2.39)	(5.58)			(0.62)***	(0.61)***		
Observations	3158				3158			
Pseudo R-squared	0.2905				0.2374			
Log Likelihood	-2107.4				-2265.1			

Robust standard errors appear in parentheses. All estimates are weighted. The columns of marginal effects represent the change in percentage points.
* significant at 10%; ** significant at 5%; * significant at 1%

Table 13
Mean Predicted Educational Choice Probabilities (Conditional to Job Characteristics)

Using Predicted Earnings

	In Canada			In United States		
(%)	High-school	College	University	High-school	College	University
Americans	*17.49*	*42.86*	*39.66*	58.7	13.72	27.59
Canadians	18.08	55.31	26.61	*64.13*	*13.17*	*22.7*

Using Predicted Earnings, Race, Parents' Educational Attainment, Tuition/Fees and Unemployment Rate

	In Canada			In United States		
(%)	High-school	College	University	High-school	College	University
Americans	*6.46*	*46.98*	*46.56*	58.7	13.72	27.59
Canadians	18.08	55.31	26.61	*67.73*	*12.6*	*19.67*

Table A1
OLS Regressions - Canada

Model	Model CA			Model CB		
	High-school	College	University	High-school	College	University
Experience	0.01	-0.00	0.01	-0.00	-0.01	0.01
	(0.01)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)
Live in Urban Area	0.05	0.03	0.00	-0.04	0.01	0.06
	(0.11)	(0.04)	(0.06)	(0.11)	(0.04)	(0.06)
Live in Regular CMA (1996)	0.11	0.04	0.26	0.05	0.11	0.19
	(0.20)	(0.10)	(0.20)	(0.20)	(0.10)	(0.20)
Live in Consolidated CA (1996)	0.00	-0.02	0.19	0.01	0.04	0.10
	(0.19)	(0.11)	(0.16)	(0.19)	(0.11)	(0.15)
Live in Regular CA (1996)	-0.17	-0.10	0.06	-0.23	-0.05	0.02
	(0.19)	(0.08)	(0.13)	(0.21)	(0.09)	(0.12)
Live Outside CMA or CA (1996)	-0.13	-0.13	0.09	-0.12	-0.06	0.08
	(0.15)	(0.09)	(0.12)	(0.17)	(0.09)	(0.12)
Non-English First Language	-0.06	-0.05	-0.11	-0.14	-0.07	-0.22
	(0.16)	(0.04)	(0.10)	(0.15)	(0.04)*	(0.09)**
Union Member				0.19	0.06	-0.11
				(0.11)*	(0.03)*	(0.08)
Union Membership Missing				0.00	0.14	0.00
				(0.00)	(0.10)	(0.00)
Covered by Collective Agreements				-0.18	0.12	0.18
				(0.20)	(0.05)**	(0.23)
Job Tenure				0.02	0.02	0.02
				(0.01)***	(0.00)***	(0.01)**
Employer Size: 20-99				-0.05	0.15	0.05
				(0.12)	(0.04)***	(0.07)
Employer Size: 100-499				0.19	0.17	0.24
				(0.10)*	(0.04)***	(0.08)***
Employer Size: 500-999				0.22	0.28	0.07
				(0.13)*	(0.05)***	(0.15)
Employer Size: More than 1000				0.16	0.23	0.08
				(0.10)	(0.05)***	(0.14)
Employer Size Missing				0.04	0.04	-1.01
				(0.09)	(0.10)	(0.70)
Occupation: Professional,Technical and Kindred				0.15	-0.01	0.33
				(0.17)	(0.04)	(0.09)***
Occupation: Managers, Officials and Properietors				0.42	0.15	0.46
				(0.11)***	(0.05)***	(0.09)***
Occupation: Clerical and Kindred				-0.14	-0.26	0.20
				(0.11)	(0.09)***	(0.12)*
Occupation: Sales				0.11	-0.08	0.09
				(0.15)	(0.07)	(0.21)
Constant	6.53	6.72	6.69	6.37	6.45	6.18
	(0.27)***	(0.11)***	(0.16)***	(0.26)***	(0.12)***	(0.17)***
Observations	436	1505	511	436	1505	511
R-squared	0.03	0.03	0.05	0.22	0.21	0.28

Robust standard errors appear in parentheses. All estimates are weighted.
* significant at 10%; ** significant at 5%; * significant at 1%
Statistics from variables of ethnicity are suppressed to protect privacy as suggested by Statistics Canada.

Table A2
OLS Regressions - United States

Model	Model UA			Model UB		
	High-school	College	University	High-school	College	University
Experience	0.00	0.03	0.01	-0.01	0.03	0.00
	(0.01)	(0.02)**	(0.01)	(0.01)	(0.01)**	(0.01)
Live in Urban Area (1996)	0.09	0.13	0.09	0.07	0.05	0.12
	(0.05)*	(0.12)	(0.10)	(0.05)	(0.12)	(0.10)
Live in SMSA (Not Central City) 1996	0.25	0.21	0.29	0.19	0.16	0.21
	(0.05)***	(0.12)*	(0.10)***	(0.05)***	(0.11)	(0.10)**
Live in SMSA (Central City Unknown) 1996	0.04	-0.02	0.09	-0.01	0.01	0.04
	(0.06)	(0.12)	(0.11)	(0.06)	(0.11)	(0.11)
Live in SMSA (in Central City) 1996	0.10	0.10	0.09	0.11	0.13	0.07
	(0.06)	(0.16)	(0.14)	(0.06)*	(0.15)	(0.13)
SMSA Information at 1996 Missing	0.30	0.14	0.58	0.29	0.02	0.50
	(0.12)***	(0.19)	(0.22)***	(0.11)***	(0.21)	(0.23)**
Aboriginal	0.00	0.37	-0.12	-0.01	0.26	-0.05
	(0.09)	(0.12)***	(0.11)	(0.09)	(0.14)*	(0.12)
Aboriginal Missing	0.05	0.30	0.00	0.06	0.23	0.05
	(0.13)	(0.21)	(0.14)	(0.12)	(0.19)	(0.13)
Black	-0.40	-0.28	-0.21	-0.31	-0.26	-0.14
	(0.04)***	(0.09)***	(0.07)***	(0.04)***	(0.08)***	(0.06)**
Hispanic	-0.16	-0.16	-0.09	-0.12	-0.14	-0.09
	(0.04)***	(0.11)	(0.08)	(0.04)***	(0.11)	(0.08)
Union Member				0.24	-0.17	-0.22
				(0.08)***	(0.16)	(0.12)*
Union Membership Missing				-0.50	0.00	0.19
				(0.38)	(0.00)	(0.11)*
Covered by Collective Agreements				0.02	0.49	-0.02
				(0.08)	(0.16)***	(0.10)
Job Tenure				0.02	0.03	0.02
				(0.00)***	(0.01)***	(0.01)***
Employer Size: 20-99				0.04	-0.01	-0.00
				(0.04)	(0.10)	(0.07)
Employer Size: 100-499				0.04	0.02	0.04
				(0.04)	(0.09)	(0.08)
Employer Size: 500-999				0.14	-0.09	0.20
				(0.06)**	(0.16)	(0.09)**
Employer Size: More than 1000				0.13	0.11	0.25
				(0.05)**	(0.10)	(0.08)***
Employer Size Missing				-0.51	0.47	0.01
				(0.21)**	(0.25)*	(0.24)
Occupation: Professional,Technical and Kindred				0.19	0.29	0.30
				(0.07)***	(0.10)***	(0.07)***
Occupation: Managers, Officials and Properietors				0.31	0.38	0.38
				(0.05)***	(0.10)***	(0.08)***
Occupation: Clerical and Kindred				-0.10	0.02	-0.04
				(0.07)	(0.12)	(0.10)
Occupation: Sales				0.30	0.63	0.36
				(0.10)***	(0.26)**	(0.10)***
Constant	6.11	5.77	6.46	6.10	5.46	6.13
	(0.14)***	(0.25)***	(0.13)***	(0.12)***	(0.24)***	(0.15)***
Observations	1909	432	713	1909	432	713
R-squared	0.09	0.08	0.06	0.21	0.24	0.16

Robust standard errors appear in parentheses. All estimates are weighted.
* significant at 10%; ** significant at 5%; * significant at 1%

Table A3
BCG Regressions - Canada

Model	Model CC			Model CD		
	High-school	College	University	High-school	College	University
Experience	0.00	-0.00	-0.00	0.00	-0.01	0.00
	(0.01)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)
Live in Urban Area	0.01	0.02	-0.02	-0.06	0.01	0.04
	(0.13)	(0.04)	(0.07)	(0.12)	(0.04)	(0.06)
Live in Regular CMA (1996)	-0.02	0.09	0.22	-0.00	0.18	0.22
	(0.28)	(0.11)	(0.22)	(0.25)	(0.10)*	(0.21)
Live in Consolidated CA (1996)	0.14	0.07	0.16	0.13	0.11	0.13
	(0.20)	(0.12)	(0.16)	(0.18)	(0.11)	(0.15)
Live in Regular CA (1996)	-0.22	-0.05	0.02	-0.24	-0.01	0.02
	(0.24)	(0.08)	(0.12)	(0.24)	(0.08)	(0.13)
Live Outside CMA or CA (1996)	-0.18	-0.08	0.07	-0.13	-0.02	0.08
	(0.19)	(0.09)	(0.12)	(0.19)	(0.09)	(0.11)
Non-English First Language	0.09	-0.05	-0.11	-0.03	-0.09	-0.29
	(0.11)	(0.05)	(0.11)	(0.11)	(0.05)*	(0.12)**
Union Member	0.00	0.00	0.00	0.21	0.06	-0.08
	(0.00)*	(0.00)*	(0.00)	(0.15)	(0.03)*	(0.07)
Union Membership Missing	0.00	-0.00	-0.00	0.00	0.14	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.10)	(0.00)
Covered by Collective Agreements	0.21	-0.05	-0.02	-0.11	0.09	0.17
	(0.15)	(0.05)	(0.10)	(0.22)	(0.06)	(0.23)
Job Tenure	-0.48	-0.06	0.33	0.03	0.02	0.02
	(0.31)	(0.11)	(0.32)	(0.01)***	(0.00)***	(0.01)***
Employer Size: 20-99	-0.00	0.08	0.14	-0.04	0.14	0.10
	(0.12)	(0.03)**	(0.07)*	(0.12)	(0.04)***	(0.06)
Employer Size: 100-499	0.14	0.11	-0.11	0.22	0.17	0.27
	(0.11)	(0.05)**	(0.12)	(0.11)*	(0.04)***	(0.08)***
Employer Size: 500-999	0.22	0.03	-0.02	0.20	0.27	0.10
	(0.14)	(0.06)	(0.10)	(0.13)	(0.05)***	(0.15)
Employer Size: More than 1000	-0.03	0.24	-0.08	0.22	0.21	0.11
	(0.26)	(0.10)**	(0.15)	(0.11)*	(0.05)***	(0.13)
Employer Size Missing	-0.06	-0.08	0.02	0.23	0.03	-1.09
	(0.08)	(0.04)*	(0.11)	(0.17)	(0.10)	(0.67)
Occupation: Professional,Technical and Kindred	-0.10	-0.08	-0.03	0.15	-0.03	0.35
	(0.14)	(0.06)	(0.11)	(0.16)	(0.04)	(0.10)***
Occupation: Managers, Officials and Properietors	0.27	0.00	0.05	0.39	0.14	0.49
	(0.20)	(0.08)	(0.13)	(0.12)***	(0.05)***	(0.09)***
Occupation: Clerical and Kindred	0.19	0.05	-0.03	-0.15	-0.28	0.23
	(0.26)	(0.07)	(0.16)	(0.12)	(0.09)***	(0.13)*
Occupation: Sales	-0.17	-0.06	-0.12	0.17	-0.11	0.10
	(0.26)	(0.07)	(0.17)	(0.18)	(0.06)*	(0.20)
Real Average Community College Fees	0.06	0.06	-0.09	0.00	0.00	0.00
	(0.14)	(0.04)	(0.08)	(0.00)	(0.00)	(0.00)
Real Average University Fees	-0.15	-0.01	0.25	-0.00	-0.00	-0.00
	(0.12)	(0.04)	(0.10)***	(0.00)	(0.00)**	(0.00)
Average Community College Fees Missing	-0.06	-0.02	0.25	0.16	-0.05	-0.08
	(0.11)	(0.06)	(0.13)*	(0.14)	(0.04)	(0.09)
Average University Fees Missing				-0.75	-0.01	0.21
				(0.26)***	(0.10)	(0.17)
Enter in Community College before 1983				-0.04	0.01	0.07
				(0.12)	(0.03)	(0.06)
Mother's Educational Attainment Some High School or Graduate				0.12	0.12	-0.17
				(0.11)	(0.05)**	(0.11)
Mother's Educational Attainment Some Postsecondary				0.09	0.04	-0.14
				(0.14)	(0.06)	(0.09)
Mother's Educational Attainment Bachelor Degree or More				0.01	0.26	-0.24
				(0.24)	(0.09)***	(0.13)*
Father's Educational Attainment Some High School or Graduate				-0.02	-0.08	-0.00
				(0.08)	(0.04)*	(0.10)
Father's Educational Attainment Some Postsecondary				-0.03	-0.06	0.02
				(0.13)	(0.06)	(0.11)
Father's Educational Attainment Bachelor Degree or More				0.22	-0.07	0.05
				(0.20)	(0.07)	(0.11)
Mother's Education: Missing				0.20	0.03	-0.07
				(0.19)	(0.06)	(0.15)
Father's Education: Missing				-0.17	-0.01	-0.15
				(0.21)	(0.06)	(0.15)
Proximity: University within 50km				0.10	0.06	-0.11
				(0.12)	(0.04)*	(0.08)
Proximity: College within 50km				-0.25	0.00	0.29
				(0.13)*	(0.04)	(0.09)***
Proximity Missing				-0.05	0.02	0.28
				(0.10)	(0.05)	(0.12)**
Constant	6.38	6.64	6.64	6.33	6.48	6.26
	(0.33)***	(0.15)***	(0.23)***	(0.33)***	(0.15)***	(0.24)***
Observations	436	1505	511	436	1505	511
R-squared	0.06	0.06	0.11	0.25	0.23	0.35

Robust standard errors appear in parentheses. All estimates are weighted.
* significant at 10%; ** significant at 5%; * significant at 1%
Statistics from variables of ethnicity are suppressed to protect privacy as suggested by Statistics Canada.

Table A4
BCG Regressions - United States

Model	Model UC			Model UD		
	High-school	College	University	High-school	College	University
Experience	-0.01	0.02	0.00	-0.02	0.03	-0.01
	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)
Live in Urban Area (1996)	0.09	0.14	0.08	0.07	0.06	0.11
	(0.05)**	(0.12)	(0.10)	(0.05)	(0.12)	(0.10)
Live in SMSA (Not Central City) 1996	0.24	0.21	0.24	0.19	0.18	0.17
	(0.05)***	(0.12)*	(0.10)**	(0.05)***	(0.11)	(0.10)
Live in SMSA (Central City Unknown) 1996	0.03	-0.03	0.07	-0.02	0.01	0.02
	(0.06)	(0.12)	(0.11)	(0.06)	(0.11)	(0.10)
Live in SMSA (in Central City) 1996	0.08	0.10	0.06	0.10	0.14	0.03
	(0.07)	(0.16)	(0.14)	(0.06)	(0.15)	(0.13)
SMSA Information at 1996 Missing	0.27	0.12	0.45	0.26	-0.01	0.38
	(0.11)**	(0.20)	(0.20)**	(0.11)**	(0.21)	(0.21)*
Aboriginal	0.05	0.45	-0.05	0.01	0.34	0.01
	(0.09)	(0.18)**	(0.12)	(0.08)	(0.16)**	(0.13)
Aboriginal Missing	0.06	0.28	-0.03	0.07	0.21	0.01
	(0.12)	(0.22)	(0.15)	(0.12)	(0.19)	(0.14)
Black	-0.35	-0.25	-0.16	-0.29	-0.24	-0.11
	(0.05)***	(0.10)***	(0.07)**	(0.04)***	(0.10)**	(0.07)
Hispanic	-0.09	-0.12	-0.03	-0.10	-0.12	-0.05
	(0.05)*	(0.14)	(0.08)	(0.05)*	(0.14)	(0.08)
Union Member	-0.00	-0.00	0.00	0.24	-0.11	-0.15
	(0.00)	(0.00)	(0.00)	(0.08)***	(0.21)	(0.12)
Union Membership Missing	0.00	-0.00	-0.00	-0.50	0.00	0.26
	(0.00)	(0.00)	(0.00)	(0.38)	(0.00)	(0.17)
Covered by Collective Agreements	0.03	0.06	0.24	0.01	0.44	-0.06
	(0.06)	(0.12)	(0.09)***	(0.08)	(0.21)**	(0.10)
Job Tenure	0.01	0.11	-0.13	0.02	0.03	0.02
	(0.10)	(0.16)	(0.12)	(0.00)***	(0.01)***	(0.01)***
Employer Size: 20-99	0.04	0.18	0.05	0.05	0.01	0.01
	(0.04)	(0.13)	(0.11)	(0.04)	(0.11)	(0.07)
Employer Size: 100-499	0.12	0.16	0.04	0.05	0.03	0.05
	(0.08)	(0.15)	(0.13)	(0.04)	(0.09)	(0.09)
Employer Size: 500-999	0.03	0.23	0.09	0.15	-0.08	0.21
	(0.11)	(0.20)	(0.13)	(0.06)**	(0.17)	(0.09)**
Employer Size: More than 1000	0.07	-0.00	-0.01	0.14	0.08	0.25
	(0.04)	(0.12)	(0.11)	(0.05)**	(0.11)	(0.08)***
Employer Size Missing	0.07	0.12	-0.07	-0.51	0.48	0.03
	(0.07)	(0.18)	(0.12)	(0.22)**	(0.23)**	(0.25)
Occupation: Professional,Technical and Kindred	0.16	0.04	0.14	0.18	0.30	0.27
	(0.08)*	(0.16)	(0.12)	(0.07)**	(0.10)***	(0.07)***
Occupation: Managers, Officials and Properietors	-0.13	0.24	0.23	0.29	0.38	0.37
	(0.07)*	(0.22)	(0.17)	(0.05)***	(0.10)***	(0.07)***
Occupation: Clerical and Kindred	0.08	-0.01	-0.03	-0.10	-0.01	-0.01
	(0.05)	(0.14)	(0.21)	(0.08)	(0.13)	(0.11)
Occupation: Sales	-0.00	0.01	-0.02	0.23	0.61	0.39
	(0.01)	(0.02)	(0.01)	(0.10)**	(0.28)**	(0.10)***
Real Average Community College Tuition	0.02	0.00	0.74	-0.00	-0.00	0.00
	(0.22)	(0.00)	(0.09)***	(0.00)	(0.00)	(0.00)
Real Average University Tuition	-0.10	-0.13	-0.18	-0.00	-0.00	-0.00
	(0.05)*	(0.10)	(0.11)	(0.00)	(0.00)	(0.00)
Average Community College Tuition Missing	0.01	0.13	0.12	0.04	-0.02	0.24
	(0.06)	(0.13)	(0.14)	(0.05)	(0.11)	(0.09)***
Average University Tuition Missing	0.91	0.15	-0.00	-0.00	0.12	-0.20
	(0.08)***	(0.15)	(0.21)	(0.09)	(0.18)	(0.12)
Mother's Educational Attainment Some High School or Graduate				0.00	0.22	0.05
				(0.04)	(0.13)*	(0.10)
Mother's Educational Attainment Some Postsecondary				0.06	0.23	0.03
				(0.07)	(0.15)	(0.12)
Mother's Educational Attainment Bachelor Degree or More				-0.01	0.21	0.07
				(0.10)	(0.17)	(0.13)
Father's Educational Attainment Some High School or Graduate				0.05	-0.03	-0.03
				(0.04)	(0.11)	(0.10)
Father's Educational Attainment Some Postsecondary				0.02	0.09	-0.09
				(0.07)	(0.14)	(0.12)
Father's Educational Attainment Bachelor Degree or More				0.12	-0.02	0.10
				(0.08)	(0.14)	(0.11)
Mother's Education: Missing				-0.10	0.41	0.25
				(0.07)	(0.17)**	(0.17)
Father's Education: Missing				0.07	-0.04	-0.06
				(0.05)	(0.14)	(0.19)
Number of Sibling in 1979				-0.00	0.01	-0.01
				(0.01)	(0.02)	(0.01)
Sibling Information in 1979 Missing				0.05	0.00	0.59
				(0.26)	(0.00)	(0.10)***
Not Both Parent Present at Age 14				-0.03	-0.15	-0.15
				(0.05)	(0.10)	(0.10)
Had only Mother at Age 14				-0.01	0.20	0.11
				(0.06)	(0.13)	(0.13)
Parental Information at Age 14 Missing				0.76	0.50	0.10
				(0.12)***	(0.22)**	(0.20)
Constant	6.15	5.80	6.44	6.21	5.32	6.19
	(0.20)***	(0.33)***	(0.20)***	(0.18)***	(0.33)***	(0.19)***
Observations	1909	432	713	1909	432	713
R-squared	0.11	0.10	0.11	0.22	0.27	0.20

Robust standard errors appear in parentheses. All estimates are weighted.
* significant at 10%; ** significant at 5%; * significant at 1%

Table A5
Trost and Lee (1984) Model: First Stage Multinomial Logit Estimates - Canada
(Reference Category: High-school)

Choice	College	University
Live in Urban (1996)	-0.38	0.35
	(0.23)*	(0.29)
Live in Regular CMA (1996)	-0.98	-0.31
	(0.59)	(0.60)
Live in Consolidated CA (1996)	-1.21	-1.31
	(0.59)**	(0.63)**
Live in Regular CA (1996)	-0.60	-0.94
	(0.45)	(0.48)*
Live Outside CMA or CA (1996)	-0.46	-1.71
	(0.48)	(0.52)***
Non-English First Language	0.19	-0.17
	(0.20)	(0.25)
Real Average Community College Fees	0.00	0.00
	(0.00)*	(0.00)**
Real Average University Fees	0.00	0.00
	(0.00)***	(0.00)
Average Community College Fees Missing	0.07	0.10
	(0.28)	(0.32)
Average University Fees Missing	-0.07	0.48
	(1.02)	(0.92)
Enter in Community College before 1983	-1.82	-2.29
	(0.25)***	(0.27)***
Mother's Educational Attainment	-0.02	-0.08
Some High School or Graduate	(0.20)	(0.27)
Mother's Educational Attainment	0.25	0.65
Some Postsecondary	(0.29)	(0.35)*
Mother's Educational Attainment	-1.03	-0.18
Bachelor Degree or More	(0.63)	(0.66)
Father's Educational Attainment	0.06	0.30
Some High School or Graduate	(0.18)	(0.26)
Father's Educational Attainment	0.13	0.64
Some Postsecondary	(0.33)	(0.39)*
Father's Educational Attainment	0.34	1.67
Bachelor Degree or More	(0.50)	(0.48)***
Mother's Education: Missing	0.47	-0.33
	(0.38)	(0.49)
Father's Education: Missing	-0.05	0.94
	(0.34)	(0.39)**
Proximity: University within 50km	-0.09	0.06
	(0.23)	(0.29)
Proximity: College within 50km	-0.07	-0.17
	(0.21)	(0.27)
Proximity Missing	-0.43	0.43
	(0.27)	(0.29)
Constant	1.86	2.39
	(0.83)**	(0.85)***
Observations	2909	
Pseudo R-Squared	0.1372	
Log-Likelihood	-2482.39	

Robust standard errors appear in parentheses. All estimates are weighted.
* significant at 10%; ** significant at 5%; * significant at 1%
Statistics from variables of ethnicity are suppressed to protect privacy as suggested by Statistics Canada.

Table A6
Trost and Lee (1984) Model: Second Stage Regressions - Canada

Model	Model CA			Model CB		
	High-school	College	University	High-school	College	University
Experience	0.01	-0.00	0.01	-0.00	-0.01	0.01
	(0.01)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)
Live in Urban Area	0.04	0.01	0.01	-0.04	-0.01	0.05
	(0.12)	(0.04)	(0.07)	(0.10)	(0.04)	(0.06)
Live in Regular CMA (1996)	0.09	0.03	0.26	0.05	0.10	0.19
	(0.22)	(0.10)	(0.20)	(0.23)	(0.10)	(0.21)
Live in Consolidated CA (1996)	-0.02	-0.02	0.18	0.01	0.04	0.10
	(0.21)	(0.11)	(0.17)	(0.21)	(0.11)	(0.16)
Live in Regular CA (1996)	-0.19	-0.08	0.06	-0.23	-0.05	0.02
	(0.21)	(0.08)	(0.13)	(0.22)	(0.09)	(0.13)
Live Outside CMA or CA (1996)	-0.15	-0.10	0.08	-0.12	-0.03	0.09
	(0.17)	(0.09)	(0.13)	(0.18)	(0.09)	(0.14)
Non-English First Language	-0.07	-0.05	-0.11	-0.14	-0.07	-0.22
	(0.18)	(0.04)	(0.10)	(0.15)	(0.04)**	(0.09)**
Union Member				0.19	0.06	-0.11
				(0.12)	(0.03)*	(0.08)
Union Membership Missing				0.00	0.13	0.00
				(0.00)	(0.14)	(0.00)
Covered by Collective Agreements				-0.18	0.12	0.18
				(0.23)	(0.05)**	(0.23)
Job Tenure				0.02	0.02	0.02
				(0.01)***	(0.00)***	(0.01)**
Employer Size: 20-99				-0.05	0.15	0.05
				(0.13)	(0.04)***	(0.07)
Employer Size: 100-499				0.19	0.17	0.24
				(0.10)*	(0.04)***	(0.08)***
Employer Size: 500-999				0.22	0.28	0.07
				(0.14)*	(0.05)***	(0.15)
Employer Size: More than 1000				0.16	0.23	0.08
				(0.11)	(0.05)***	(0.14)
Employer Size Missing				0.04	0.04	-1.02
				(0.08)	(0.13)	(1.08)
Occupation: Professional,Technical and Kindred				0.15	-0.02	0.33
				(0.18)	(0.04)	(0.10)***
Occupation: Managers, Officials and Properietors				0.42	0.14	0.46
				(0.12)***	(0.05)***	(0.10)***
Occupation: Clerical and Kindred				-0.14	-0.27	0.21
				(0.12)	(0.09)***	(0.14)
Occupation: Sales				0.11	-0.09	0.08
				(0.17)	(0.06)	(0.23)
Non-Selection Hazard: High School	0.06			-0.00		
	(0.15)			(0.13)		
Non-Selection Hazard: College		-0.10			-0.11	
		(0.08)			(0.07)	
Non-Selection Hazard: University			-0.02			0.01
			(0.10)			(0.09)
Constant	6.68	6.65	6.67	6.36	6.38	6.20
	(0.35)***	(0.12)***	(0.20)***	(0.37)***	(0.12)***	(0.20)***
Observations	436	1505	511	436	1505	511
Standard Errors	0.65	0.43	0.53	0.59	0.40	0.46
rho-1/rho-2/rho-3	0.10	-0.24	-0.04	-0.01	-0.29	0.03
R-squared	0.03	0.03	0.05	0.22	0.21	0.28

Bootstrap standard errors based on 400 replications appear in parentheses. All estimates are weighted.
* significant at 10%; ** significant at 5%; * significant at 1%
Statistics from variables of ethnicity are suppressed to protect privacy as suggested by Statistics Canada.

Table A7
Trost and Lee (1984) Model: First Stage Multinomial Logit Estimates - United States
(Reference Category: High-school)

Choice	College	University
Lived in Urban Area (1979)	0.22	0.40
	(0.17)	(0.18)**
Live Outside SMSA in 1979	-0.64	-0.40
	(0.17)***	(0.17)**
Live in SMSA (Not Central City) 1979	-0.53	-0.27
	(0.20)***	(0.19)
Live in SMSA (Central City Unknown) 1979	-0.72	0.20
	(0.23)***	(0.22)
Live in SMSA (in Central City) 1979	0.51	0.68
	(0.27)*	(0.30)**
SMSA Information in 1979 Missing	-1.26	-1.25
	(0.57)**	(0.64)*
Aboriginal Missing	0.61	0.49
	(0.44)	(0.46)
Black	0.18	-0.30
	(0.16)	(0.16)*
Hispanic	1.05	0.13
	(0.19)***	(0.20)
Real Average Community College Tuition	0.00	0.00
	(0.00)	(0.00)
Real Average University Tuition	0.00	0.00
	(0.00)**	(0.00)***
Average Community College Tuition Missing	-0.61	-1.31
	(0.17)***	(0.16)***
Average University Tuition Missing	0.17	0.02
	(0.36)	(0.43)
Mother's Educational Attainment	0.56	0.66
Some High School or Graduate	(0.21)***	(0.22)***
Mother's Educational Attainment	1.08	1.52
Some Postsecondary	(0.29)***	(0.27)***
Mother's Educational Attainment	1.25	1.84
Bachelor Degree or More	(0.34)***	(0.30)***
Father's Educational Attainment	0.26	0.17
Some High School or Graduate	(0.19)	(0.18)
Father's Educational Attainment	0.77	1.15
Some Postsecondary	(0.26)***	(0.22)***
Father's Educational Attainment	1.21	1.95
Bachelor Degree or More	(0.27)***	(0.22)***
Mother's Education: Missing	-0.34	-0.16
	(0.36)	(0.43)
Father's Education: Missing	0.20	-0.02
	(0.27)	(0.31)
Number of Sibling in 1979	-0.04	-0.11
	(0.03)	(0.03)***
Sibling Information in 1979 Missing	-27.70	0.61
	(0.79)***	(1.17)
Not Both Parent Present at Age 14	0.21	-0.43
	(0.20)	(0.21)**
Had only Mother at Age 14	0.05	0.28
	(0.25)	(0.27)
Parental Information at Age 14 Missing	-1.18	-0.03
	(1.39)	(1.34)
Constant	-2.88	-2.26
	(0.35)***	(0.31)***
Observations	3158	
Pseudo R-Squared	0.1675	
Log-Likelihood	-2472.75	

Robust standard errors are in parentheses. All estimates are weighted.
* significant at 10%; ** significant at 5%; * significant at 1%

Table A8
Trost and Lee (1984) Model: Second Stage Regressions - United States

Model	Model UA			Model UB		
	High-school	College	University	High-school	College	University
Experience	0.01	0.03	0.01	-0.01	0.03	0.01
	(0.01)	(0.02)**	(0.01)	(0.01)	(0.01)**	(0.01)
Live in Urban Area (1996)	0.08	0.13	0.10	0.06	0.05	0.12
	(0.05)	(0.12)	(0.10)	(0.05)	(0.12)	(0.11)
Live in SMSA (Not Central City) 1996	0.26	0.21	0.27	0.20	0.16	0.20
	(0.05)***	(0.12)*	(0.10)***	(0.05)***	(0.12)	(0.10)*
Live in SMSA (Central City Unknown) 1996	0.05	-0.02	0.07	-0.00	0.01	0.03
	(0.06)	(0.12)	(0.11)	(0.06)	(0.12)	(0.11)
Live in SMSA (in Central City) 1996	0.09	0.10	0.06	0.10	0.13	0.05
	(0.06)	(0.15)	(0.14)	(0.07)	(0.14)	(0.13)
SMSA Information at 1996 Missing	0.29	0.14	0.55	0.29	0.02	0.48
	(0.11)***	(0.19)	(0.23)**	(0.11)**	(0.23)	(0.24)**
Aboriginal	0.05	0.36	-0.04	0.02	0.24	0.00
	(0.09)	(0.19)	(0.12)	(0.09)	(0.17)	(0.13)
Aboriginal Missing	0.02	0.30	0.01	0.05	0.24	0.05
	(0.13)	(0.23)	(0.15)	(0.14)	(0.21)	(0.14)
Black	-0.38	-0.28	-0.16	-0.30	-0.26	-0.11
	(0.05)***	(0.09)***	(0.07)**	(0.04)***	(0.08)***	(0.07)
Hispanic	-0.15	-0.15	-0.05	-0.12	-0.13	-0.06
	(0.04)***	(0.11)	(0.09)	(0.04)***	(0.10)	(0.08)
Union Member				0.24	-0.17	-0.20
				(0.08)***	(0.17)	(0.12)*
Union Membership Missing				-0.52	0.00	0.22
				(0.45)	(0.00)	(0.15)
Covered by Collective Agreements				0.01	0.50	-0.04
				(0.08)	(0.17)***	(0.11)
Job Tenure				0.02	0.03	0.02
				(0.00)***	(0.01)***	(0.01)***
Employer Size: 20-99				0.04	-0.01	0.00
				(0.04)	(0.10)	(0.07)
Employer Size: 100-499				0.05	0.02	0.04
				(0.04)	(0.09)	(0.09)
Employer Size: 500-999				0.14	-0.08	0.21
				(0.06)**	(0.16)	(0.09)**
Employer Size: More than 1000				0.13	0.11	0.24
				(0.05)**	(0.11)	(0.08)***
Employer Size Missing				-0.51	0.47	0.01
				(0.22)**	(0.25)*	(0.24)
Occupation: Professional,Technical and Kindred				0.18	0.29	0.30
				(0.07)***	(0.10)***	(0.07)***
Occupation: Managers, Officials and Properietors				0.30	0.38	0.37
				(0.05)***	(0.10)***	(0.07)***
Occupation: Clerical and Kindred				-0.10	0.03	-0.04
				(0.07)	(0.13)	(0.10)
Occupation: Sales				0.29	0.64	0.35
				(0.10)***	(0.27)**	(0.10)***
Non-Selection Hazard: High School	-0.16			-0.08		
	(0.06)**			(0.06)		
Non-Selection Hazard: College		-0.03			-0.05	
		(0.17)			(0.17)	
Non-Selection Hazard: University			0.11			0.07
			(0.06)*			(0.05)
Constant	5.91	5.73	6.54	6.00	5.38	6.19
	(0.16)***	(0.41)***	(0.14)***	(0.14)***	(0.38)***	(0.17)***
Observations	1909	432	713	1909	432	713
Standard Errors	0.64	0.65	0.63	0.59	0.60	0.60
rho-1/rho-2/rho-3	-0.25	-0.04	0.18	-0.14	-0.09	0.12
R-squared	0.09	0.08	0.06	0.21	0.24	0.16

Bootstrap standard errors based on 400 replications appear in parentheses. All estimates are weighted.
* significant at 10%; ** significant at 5%; * significant at 1%