

Returns to Education and Youth Labour Force Participation

By Timothy A. Boyle

(6548186)

Major Paper presented to the Department of Economics of the University of Ottawa in partial fulfillment of the requirements of the M.A. Degree

Supervisor: Professor Seccareccia

ECO6999

Ottawa, Ontario

November 2012

Abstract

This paper examines the returns to education and their effect on youth labour force participation. It examines trends in the labour force and changes in school enrolment rates. The review of the literature provides a background on returns to education and various models used in estimation. Using data from the Survey of labour and income dynamics and the labour force survey, estimates on returns to schooling are measured. The model adopted in the empirical section is the basic Mincer model of log-earnings based on education level, experience and experience squared. Estimates for returns to education were between 9.6% and 11.2% for males, and between 11.1% and 16.7% for females. In recent times, there have been policy changes forcing youths to attend school until the completion of high school or age 18 in Ontario. This policy highlights the value of education in today's labour market. Education is one factor that is causing a downward shift in the labour force participation rates for youths.

Table of Contents

Introduction	4-7
Labour Force Trends	7-13
Benefits of Education	13-19
Review of Literature	19-26
Data Methodology	26-28
Results	28-35
Conclusion	35-38

“Congress has indicated a strong interest in ensuring that today’s young people—those ages 16 through 24—attain the education and employment experience necessary to make the transition to adulthood as skilled workers and taxpayers. In the wake of the December 2007-June 2009 recession, questions remain about the employment prospects of youth today and the possible effects on their future earnings and participation in the labor market.” (Fernandez-Alcantara 2012, p. 2)

Although this quote is taken from an American source, it still offers similar direction to what Canada wants to do for its youth group. Canada’s current economic situation is troublesome and changing for the youth as education is becoming a more attractive avenue than entering the labour force. Education and experience are requirements for jobs in today’s economy. How can one obtain education and work experience at the same time? It seems as though education requires full time effort to receive benefits, while work experience can be gained on a part-time basis. A combination of education and part-time work may not be available to everyone, and everyone may not want to participate in both activities simultaneously. So which path should the youth demographic group select? Should they choose to further education? Or choose to gain work experience in the labour market?

The labour force participation rate of youth, when compared to other demographic groups, is mostly sensitive to the business cycle. This makes youth an interesting topic for economic research. Teens have more volatile movements than both young adults and adults. It appears that as one ages, the impact of the business cycle on labour force participation becomes less severe. Figure 1 below demonstrates the volatility of teens (16-19), young adults (20-24) and adults (25+). Youth are more likely to drop out of the labour force due to economic hardships and join during periods of economic growth. Education is one alternative to the labour market where youth can enroll in school and gain qualifications for better jobs.

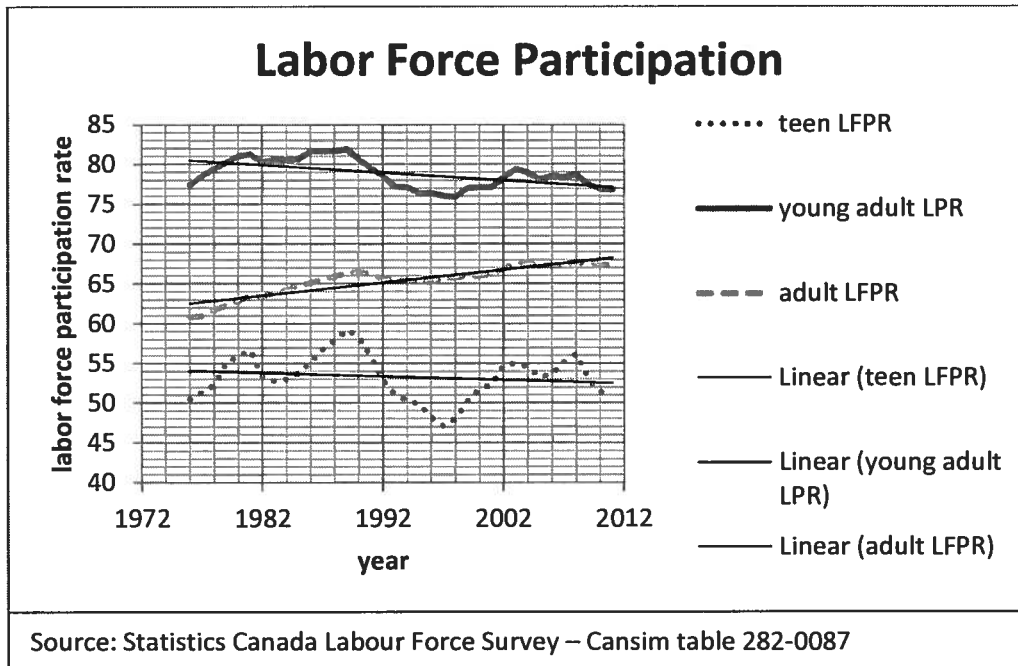


Figure 1 *The labour force participation rate of youths, consisting of teens and young adults, displays more volatility than the adult demographic group. Although young adults have higher participation rates than adults, their decision to participate is more sensitive to cyclical fluctuations than adults.*

Education is invaluable in today's economy. Each and every day that is dedicated to obtaining an education has the potential to enhance a person's future income. One of many factors that influence this relationship is the duration of time spent on education. Are those with greater earnings also those with greater education? Building on the analytical frameworks offered by human capital theory and signaling theory, questions on the relationship between earnings and education will be addressed. There are two ways in which prolonged schooling can increase wages. First, extra education increases human capital and productivity, which will eventually be reflected in higher labour market earnings. Second, extra schooling is used as a signaling device for high ability workers, which places such workers in a more preferred position in the labour hiring queue.

Education itself is enticing to youth as both human capital theory and signaling theory demonstrate that increases in education promote increases in wages, greater attachment, and overall better performance in the labour market. Becker (1975) shows that those with a higher education have a lower unemployment rate, thereby suggesting labour market success, and a greater participation rate connecting them to the labour market. "School enrolment is also cyclical, as a certain number of youth go back to school because they have difficulty finding work. Our estimates suggest that, for every 100 young people who leave the labour force as a result of the cyclical job situation, 50-65 go back to school." Archambault and Grignon (1999 p. 79)

Experience is another asset youth look to possess as it also increases earnings. As work experience rises, expected earnings rise. Experience offers income right away and future increases to that income. As seen in Dougherty (2000), work experience has the largest absolute impact on earnings over all job training. On-the-job training is a method to gain human capital while gaining experience in the labour market. Since they incur many of the costs, firms still share with their employees some of the returns to investment in specific training (Becker, 1964; Mincer, 1974). This, however, still allows employees to achieve greater earnings by enrolling in firm specific training. Experience offers gains in the present and larger gains in the future.

The earnings of an individual grow with work experience. Males expect to see 4% - 4.8% growth in earnings with each extra year of experience, while females expect 2.8% - 4.4% gains from an extra year (Boothby and Drewes 2004). The age earnings profile suggests that earnings growth

from experience peaks at around middle age and declines later in life. This suggests that experience is most valuable early in life as it provides diminishing returns later in life.

Education and experience offer benefits that appeal to youth. Both offer returns for future gains in earnings. Which option is more appealing to youth? This paper will explore trends in the labour market and educational system and estimate returns on investment in education to determine if further education can offer benefits that attract youth away from the labour market.

The remainder of this paper contains six parts. It begins with a review of the trends in youth labour force participation and school enrolment rates over time. That is followed by a review of competing theories explaining the benefits of education. Next there will be a review of the literature highlighting past estimates for returns to education and issues with estimation, which is then followed by a data and methodology section. Subsequently, there will be an empirical section estimating the returns to education. Finally, there will be a conclusion to summarize all the results.

Labour Force Trends

The decision between entering the labour market and pursuing activities outside the labour force can be challenging for today's teenagers and young adults. There have been moderate declines in youth (16-24) male labour force participation between 1976 and 2012, as can be seen in figure 2 below. Females, on the other hand, experienced gains in labour force participation rates between 1976 and 2012.

According to Fortin and Fortin (1999), labour force activity can be explained by three factors:

1. Living situation (demographic group, family size)
2. Current economic conditions (job availability, school attraction, income)
3. Availability of alternate sources of income (EI, social assistance, pension plans)

As seen in figure 2, youth males are leaving the labour market and females are joining the labour market. Youth see these factors that affect labour force participation differently than adults. Most youth do not qualify for alternate sources of income, and school is mandatory for those below the age of 16. "Income support and UI have a modest effect on young people's decision to remain in the labour force or to attend school. Changes made to the UI program during the 1990's only account for 3% of the decrease in youth participation rate."

(Archambault and Grignon 1999, p. 79). Youth have their parents as an alternative source of income when choosing between school and entering the labour market. This parental support provides an opportunity for them to continue schooling by making an investment in education. Youths are more likely to be enrolled in school, which limits the labour force participation rate for their demographic group.

Figure 2 shown below depicts labour force participation for the youth group age 15-24, for each gender. There is a negative linear trend for males and a slightly positive linear trend for females. This suggests that males are transitioning away from the labour market and females are transitioning into the labour market. Schooling acts as a substitute for the labour market. Therefore, when there are decreasing trends in the labour market, there should be increasing trends in schooling enrolment and vice versa.

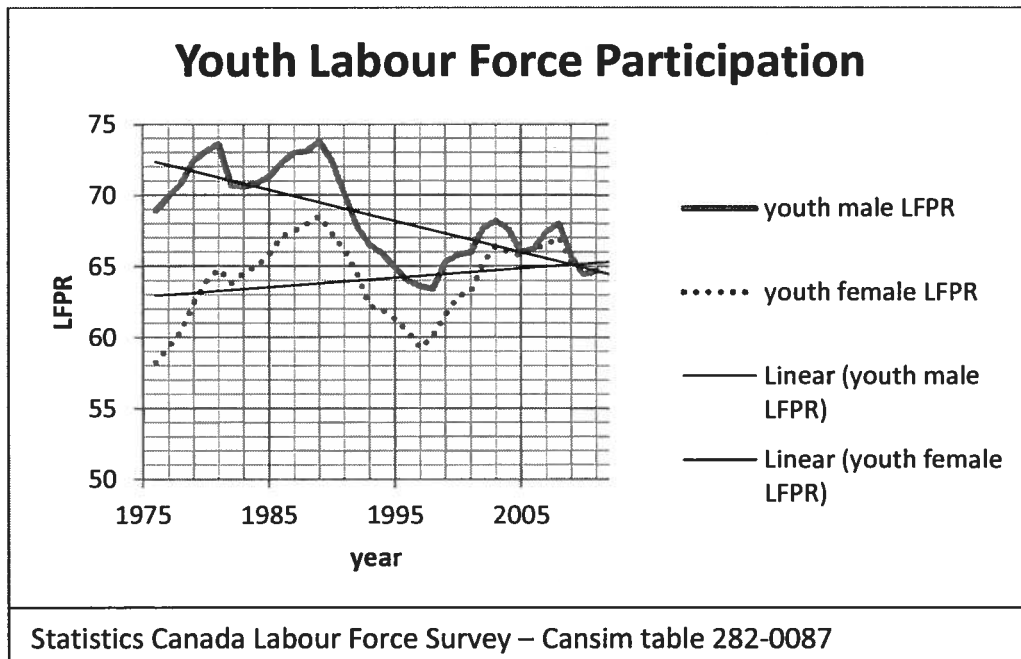


Figure 2 displays youth male and youth female labour force participation. It shows a consistent slightly positive linear trend for females, while males exhibit a negative linear trend.

Under the assumption that individuals know the expected returns to education, conclusions can be made about what is happening in the schooling system. Although students are becoming more available to participate in both the labour market and the schooling system, as shown in figure 3, an increase in the labour force participation rate should be associated with a decrease in the school enrolment rate. The difference between student and non-student participation

shows the participation rate varies largely with school enrolment. On the basis of this pattern of labour force behaviour, males would be expected to have rising school enrolment rates and furthermore, positive growing returns to education. Females, on the other hand, are expected to have slight drops in school enrolment which suggests a weaker return to education. Finding the proportion of youths who are entering school will allow for analysis between labour market conditions and schooling popularity. From the above, one would suspect that males will have growing school enrolment and females to have decreasing school enrolment.

From figure 2, it appears that males and females both see positive linear trends in labour force participation shortly after 1995. This suggests that both males and females were transitioning into the labour market and away from the school system. Therefore, there should be decreasing student enrolment rates associated with relatively lower returns to education.

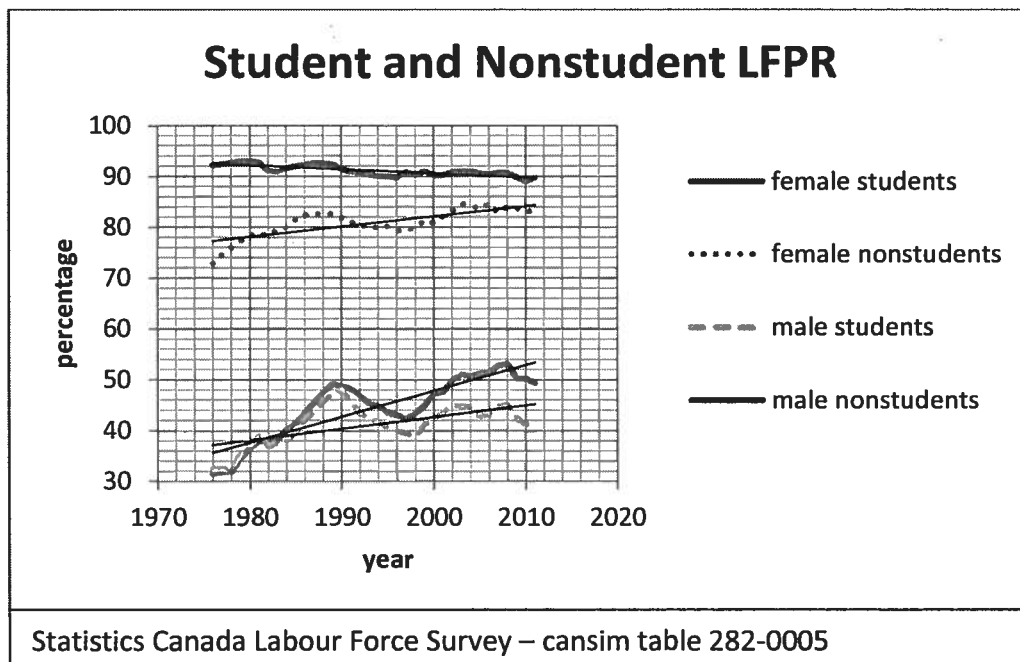


Figure 3 Although students' labour force participation rates displays an upward trend, students still lack the magnitude or relative weight presented by the nonstudents who are much more

active in the labour market. This identifies the lack of participation by those enrolled in school. Thus, a rising school enrolment rate suggests a decreasing labour force participation rate, because the majority of students do not also participate simultaneously in the labour market.

Participation in the labour market by youths is highly dominated by those not enrolled in school. As seen above, males have approximately 90% participation in the labour market for nonstudents and only 45% for those enrolled in school. Similarly, females have approximately 80% participation in the labour market by nonstudents and about 50% for those enrolled in school. Females saw a maximum participation by students in 2008 at 53.1% and a minimum participation of 31.5% in 1976. Nonstudent females had a maximum of 84.6% labour force participation rate in 2003, while a minimum participation rate occurred in 1976 at 72.8%. Males saw a maximum participation rate by students at 47.9% in 1990 and a minimum labour force participation rate of 32.5% in the late 1970's.

Figure 3 shows why school enrolment rates work against labour force participation rates. Those who enter school become less likely to participate in the labour market compared to those that do not enter school. Education must offer an alternative to the labour market and potential earnings. According to both human capital theory and the screening hypothesis, increasing education offers greater earnings in the future. Education is an investment in future earnings. Therefore, those enrolled in school will earn the income lost during the schooling phase later in life.

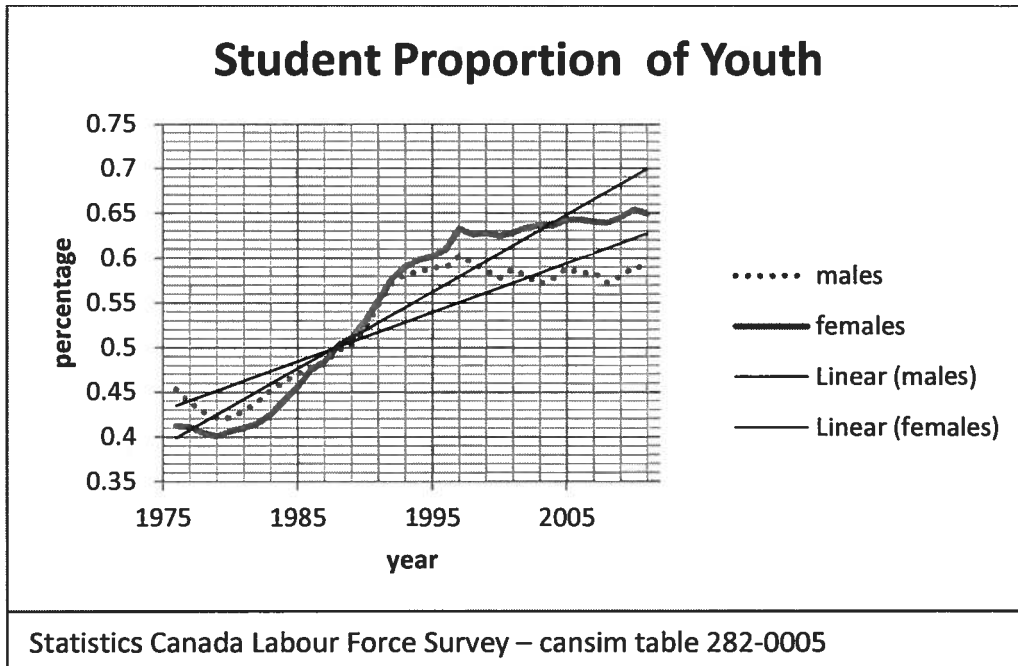


Figure 4 *There is positive linear trends for both males and females in school enrolment rates. A greater proportion of students of both genders are pursuing an education. Females have a stronger linear trend than males. After 1995, males appear to have a decreasing trend and females have a positive trend.*

There are positive linear trends for both males and females as seen in figure 4. The trend line of females has a greater slope than that of males, highlighting the faster growth of school enrolment rates for females. Something must attract youth to education. A strong return to education for both males and females may be the cause of the transition. It also suggests that there should be negative linear trends in youth labour force participation for both males and females to account for the high levels of students for these demographic groups.

After 1995, males have a decreasing trend and females have an increasing trend in school enrolment. This suggests that males are transitioning back to the labour market and females

are transitioning away from the labour market toward education. Therefore we expect to see decreasing trends in returns to education for males and increasing trends for females.

Education is one factor that can be linked to the differences in participation rates between youths and adults. It is readily available to teenagers and it becomes less available as one ages. There have been consistent increases in school enrolment each year and students are predominantly found in the youth demographic group. An expectation during economic hardships is a rise in unemployment rates, which would suggest that the labour market is not the best option when education is becoming more appealing for today's youth. Teenagers and young adults are primarily the *last in, first out* employees during economic hardships (Tella 1965). This means that youth are the last employees hired by a firm, and during economic downturns are the first to be let go or fired. This crutch promotes continued schooling in recessions, thereby causing a weak labour force participation rate.

Youth who attend school have a desire to learn and increase their own human capital or signal themselves to employers as strong workers. The next section highlights the benefits of school through competing theories: human capital theory and the screening hypothesis. Both offer rewards for increased schooling which may sway youth in the decision to attend school or find work in the labour force.

Benefits of Further Education

Human Capital Theory

As discussed in Cahuc and Zylberberg (2004), the human capital and screening models are two competing theories to identify the benefits to further education. Human capital is the stock of competencies, knowledge or personality traits embodied in the ability to perform labour to produce economic value. “[It is] activities that influence future monetary and psychic income by increasing the resources in people. These activities are called investments in human capital.” Becker (1975, p. 15). The theory of human capital states that education, training, or anything that improves productivity, increases wages. Traditionally, university education provides a set of general and specific attributes that are applicable to many of the jobs available in the market, while other institutions such as barber schools provide only specific training fixed for one job in the market. The theory predicts that schooling is an investment that will produce income in the future and that wage differences are a reflection of productivity differences—which are determined in part by the level of education. Each individual has a stock of human capital, which is capable of increasing with extra training or education.

As done by Cahuc and Zylberberg (2004 p. 75), a mathematical representation of the predictions shows that there is a positive relationship between human capital and expected earnings. Therefore a person’s earnings are a function of the level of human capital that he or she has obtained. Schooling is a form of human capital and therefore increases in schooling will increase earnings. The predictions made from the theory are clearly identified in this case. Earnings will increase when human capital increases. This implies that education, training and any sort of gains in human capital are investments in future incomes.

Investments in human capital increase one's productivity which increases total output. Extra gains from output increase GDP per capita. Since one's productivity changes total output, the gains made from the excess output are reflected in the increased earnings. Human capital theory suggests that GDP per capita rises and falls with changes in productivity, which can be defined as the increases in human capital. Earnings reached by an individual are measured by the level of productivity of that individual. Therefore, the earnings potential of an individual has no bearing on the earnings of other individuals. .

Screening Hypothesis

Education does not increase productivity, but it highlights greater ability to employers.

"Individuals with more schooling tend to earn more not because schooling makes them more productive, but rather because it credentiares them as more productive." (Solon and Hungerford 1987, p. 175). As done by Cahuc and Zylberberg (2004, p. 75), a mathematical representation of the predictions shows that there is a positive relationship between the screening hypothesis and expected earnings. Individuals with high ability are more productive and demand greater wages. The assumption of the screening hypothesis is that more efficient individuals attend school longer to identify themselves to employers.

Those with greater education are those with greater ability, and who reach greater wages.

Therefore the conclusion found from a screening model is that those who attend school longer have greater earnings than those with less education. Note that this model does not highlight productivity growth through education, since education acts as a screening device to rate individuals for employers in a selection ladder. Since there is no productive gain attributed to

education in the screening hypothesis, GDP per capita does not change when individuals with high ability are employed. Therefore, the increase in earnings for a high ability individual must come at the expense of lower ability workers.

Employers look for signals when looking to fill available job positions. Employers must invest in the hiring process through wages while not having observed productivity level. Education can be thought of as a signaling cost. Individuals only attend school to the point where costs are less than the expected returns or benefits from education. One assumption must hold for signaling theory to work effectively: the costs of a signal such as education must be higher for those with less ability or productive capacity. These costs are both opportunity cost and real costs of education (Spence 1973).

Signalling theory does not come without its flaws. It is often difficult to measure if signalling has been effective. Wage differentials between those with high levels of education and those with low levels of education are limited by the issue of underemployment. With higher education individuals signalling themselves and only obtaining jobs below their level of ability, the signal is not paying off. "If education is too productive relative to the costs, everyone will invest heavily in education and education may cease to have a signalling function." (Rohling 1986, p. 818).

There are similar issues in empirical findings for both human capital and signalling theories. As the number of youths in the education system grows, the effect of signaling through education becomes weaker.

"Over education" is a situation where one's level of education is higher than the level of education required for their current work position. Similarly, "under education" is when one

has less education than the minimum requirement of the job in which one is working. With a continued growth of youths enrolling in formal education, and current economic hardships, there is potential for growth of over education in the labour market. As noted by Aina and Pastore (2012, p. 8), “the degrees more frequently associated to over education are: Agriculture, Arts, Education, Languages, Physical Education, Political Science and Psychology.” These degree paths are the most probable for over education, suggesting that those graduates may be working in jobs that require less education than what they have obtained. The authors also estimate a wage penalty of approximately 10% of the median wage for workers who are over educated. Those who are under educated for their job reap greater returns to education than those who became over educated. Over education highlights a return on investment in education lower than what was expected prior to entering the schooling system. Under education provides a greater than expected return on investment in education.

The screening hypothesis is at odds with human capital theory. This is due to the fact that screening declares that the extra schooling does nothing to improve productivity; it only sends a signal to employers about productive abilities. For both screening and human capital, it is clear that those who attend school longer enjoy greater earnings and stronger success in the labour market. As seen in Groot and Oosterbeek (1994), empirical analysis shows that human capital theory predictions are confirmed, which minimizes the validity of screening theory.

The issues of crowding out are seen directly in screening models. In human capital theory, all increases in productivity translate into increases in GDP per capita, supporting the increase in wages due to higher education. However, signaling theory has no connection to productivity in

the labour market. Increases in wages from education are somewhat done seemingly at the expense of someone else.

Assessment of the Two Theories

There has been an on-going debate over the value education plays in the labour market. As seen earlier, human capital theory and signalling theory are the rival contenders. Each theory has its weaknesses. Human capital predicts that earnings rise with increased education, but as noted by Livingstone (1997), school enrolment rates have had significant increases, while average incomes have remained stagnant. These empirical findings dispute the theory of human capital and its connection to the real economy. Another issue with human capital in empirical findings is "over education". "Growing proportions of people who have invested many years of their lives in acquiring advanced formal educational qualifications are unable to obtain commensurate jobs." (Livingstone, 1997 p.11). Problems of job matching have become issues for those with higher education. Underemployment refers to highly educated people working in jobs that are beneath their expected return from their investment in education. Empirical findings on signalling and human capital have been compared in various settings. Rohling (1986) used data on several individuals of different education levels and compared their incomes with the type of job, field of study, and whether the job was permanent or temporary. Human capital theory predicts that using one's education on the job would command a higher wage than having the same level of education and not putting their degree to work. Two workers in the same job with different educational backgrounds should receive different wages according to human capital theory. Screening and signalling theory predicts no

wage differentials between the two workers. As seen in Rohling (1986), empirical evidence provides support for human capital theory at the expense of signalling theory. As today's youths pursue extra education as opposed to entering the labour market, the surplus of students should shrink the expectation of returns on investment in education by signalling theory, but should have no effect on the returns following human capital theory.

Human capital and screening models find that individuals with higher levels of education have greater earnings. Those who transition into the school system and away from the labour market will expect higher future earnings. There are positive returns to education as those with higher levels of schooling earn more than those without. Next we will review past literature on returns to education.

A human capital model developed by Jacob Mincer has been used extensively in estimating returns to education. It has been shown that both screening and human capital approaches offer returns on investment in education. The returns to education have been estimated regularly in the past and the next section highlights the findings.

Review of the Literature on Returns to Education

In the past, several studies have estimated returns to investment in education. Returns to education have been explored and measured using ordinary least squares estimation and instrumental variable estimation. Different surveys and census data are used that produce different estimates. There have been many papers, both foreign and Canadian, that have

attempted to quantify the returns to education using a variety of models. All models have a basic format like the one shown below. The variable description is as follows; X is a set of control variables that varies from paper to paper, S is total years of schooling, Y is earnings and U is an error term. The general world average return to education is approximately 10%, as estimated by Psacharopoulos and Patrinos.(2004, p. 112).

$$\ln Y = \alpha + \beta S + X\gamma + U$$

U.S. Estimates

The rate of return to education has been estimated extensively in the USA. Private returns are greater than social returns because the government subsidizes education. Primary education is a major priority for investment. As seen in Psacharopoulos (1985, p. 388), “the social rate of return to primary education exceeds by several percentage points the returns to secondary and higher education.” Although primary education is most valuable, secondary and higher education also offer strong returns in the private and social sectors.

Using the 1960, 1970 and 1980 Census data, Angrist and Krueger (1991) and Staiger and Stock (1997) produce IV estimates that range from 6% to 10% (OLS is 5-6%) using quarter year of birth as an instrument for school level. They use quarter year of birth as an instrument. Instrumental variable estimation was used because they found schooling to be correlated with other factors found in the error term. Ordinary least squares would provide a biased estimate due to the correlation between the covariates and the error term. The empirical results drawn from this paper use a sample of men born between 1930 and 1949 inclusive that have positive earnings.

The regression model used had a similar form as the one shown above. The 2SLS estimate is shown below.

$$(1) S_i = X_i\pi + \sum_c Y_{ic}\delta_c + \sum_c \sum_f Y_{ic}Q_{if}\theta_{fc} + \epsilon_i.$$

$$(2) \ln W_i = X_i\beta + \sum_c Y_{ic}\gamma_c + \rho S_i + \mu_i. \text{ (Angrist and Krueger 1991, p. 997).}$$

These are the two stage least squares formulas Angrist and Krueger(1991) used, where S is schooling, Y is year of birth, Q is quarter of birth, X is a set of covariates common to both equations, W is the weekly wage, and ρ is the return to education. OLS estimates are computed using only equation 2. Angrist and Krueger used quarter year of birth as an instrument trying to estimate returns to education. Compulsory schooling laws force individuals to stay in school until they reach a specified age (usually 16), but based on month of birth, one will reach the dropout age earlier than others even though they began school at the same time.

Using NLSYM (National Longitudinal Survey of Young Men) data from the 1970s, Card's (1995) IV estimates are between 9.5% and 13.2% (OLS is 7.3%) using proximity to college and family background as an instrument. "Instrumental variable estimates of the return to education are 25-60 percent higher than the corresponding ordinary least squares estimates." (Card 1995 pg. 2). The 2SLS estimation models are shown below.

$$(1) S_i = X_i\gamma + C_i\delta + C_iP_i\epsilon + v_i$$

$$(2) y_i = X_i\alpha + C_i\theta + S_i\beta + u_i \text{ (Card 1991 p. 19)}$$

Here X_i is a vector of observed characteristics, C_i is proximity to college, P_i is an indicator of poor family background, schooling is labelled as S_i , log wages as y_i and β is the measure of the return

to education. Proximity to college and poor family background are used as an instrument to estimate returns to education. Card makes the assumption that the direct earnings effects of living in a close proximity to a college do not vary by family background. Similarly, Kane and Rouse (1995) (based on the NLSYM Class of 1972) estimate returns to education using IV at 9.4% (OLS is 6.3%). This also shows IV estimates are greater than OLS estimates for returns to education. Using more recent data at the time from the NLSYM class of 1979, Cameron and Taber's (2005) IV estimates range from 5.7% to 22.8% across different specifications (OLS is about 6%).

Canadian Estimates

There have been different approaches to studying the returns to education and the labour force response. Samples are obtained from various sources and several regression models are used. The main factors that are seen in every model are work experience and level of education.

Boothby and Drewes (2004) estimate differences in earnings based on educational attainment. They use census data from 1981- 1996. They design a model where they can examine the differences in earnings between individuals with high school education and individuals with greater levels of educational attainment. Boothby and Drewes use ordinary least squares estimation of the human capital model shown below.

$$\ln W = \beta_0 + \beta_1 EXP + \beta_2 EXP^2 + D\gamma + S\delta + X\theta + u$$
W is the weekly wage, EXP is work experience, D is a binary variable for each class above high school, S is the total level of schooling and X is a set of control variables. They find that men who attend and complete

university, receive a 36%-46% (female 58%-63.5%) earnings increase compared to those with only a high school diploma. These results suggest there are major gains to be made from additional school especially for females.

Using census data from 1990-2005, Bourbeau, Lefebvre and Merrigan (2010) found estimates for earnings premiums between different levels of educational attainment. They used ordinary least squares to estimate a log weekly wages model of ten education variables and other control variables such as experience and experience². They found that men with a bachelor's degree from university had a 39%-55% (females 48%-65%) earnings premium over those with just a high school diploma. This demonstrates that education offers a strong return on investment and provides better earnings in the future.

Boothby and Rowe (2002) found median rates of return to the bachelor's degree were 12% for men and 13% for women. They also estimated returns to education by field of study and gender. They show that women have strong returns to education over almost every field with the weakest return seen in biology at around 11%. Men have the smallest return in sociology and social services, with a return being just over 5%. Not only does the level of school matter but the topic of study can also vary one's return on investment in education.

Issues with Estimation

As seen earlier, the human capital and screening models highlight benefits to choosing education. Individuals who recognize this benefit may choose school over the labour market. Taking a look at youth performance in the labour market in the past and what others have provided in research papers will provide a foundation for further empirical research. Past

research, as seen in Griliches (1977), suggests that estimating returns to education can be quite difficult. He highlights two issues with computing returns to education using OLS estimation: selection bias and omitted variable bias. Instrumental variables remove the bias in the estimation. These biases highlight the differences between the instrumental variable estimate and the ordinary least squares estimate.

An earnings model shown below is a regression model which can be used to estimate returns to education. The function variables are defined as follows; Y_i is an individual's earnings, S_i is the amount of schooling the individual has completed, X_i is a set of control variables, and finally the error term with mean zero to reflect heterogeneity between individuals.

$$\ln(Y_i) = \alpha_1 + \beta_1 S_i + \beta_2 X_i + \varepsilon_i$$

An earnings model like the one shown above is based on a debatable hypothesis. The return to education is constant for each extra year of schooling. This assumption assumes that an extra year of university education is equally beneficial to an extra year of high school. As seen in Mincer (1974), the rate of return to education decreases with the duration of schooling. Therefore the results of the basic model are suspect, as it assumes an equal rate of return to education for each extra year regardless of duration of schooling.

Selection bias exists because our sample considers only those with positive earnings and therefore ignores the unemployed section of the labour market. This limits the results to comparing only those who have found employment. This bias restricts estimates by ignoring the numbers of unemployed in each education and work experience level. Those with low education and work experience may include individuals with high earnings, but they are also

the demographic group with the highest unemployment rate, which is not accounted for by the estimates. This may cause a downward bias on estimates for returns to education.

Omitted variable bias is seen particularly for missing aptitudes and abilities. This issue directs an upward bias on the returns to education estimate. Human capital and signalling theories both predict more productive student to pursue school longer, so those with a greater natural ability have an advantage in school, which leads to an upward bias on the estimate of the returns to education. There are also unobserved abilities that contribute to attaining a certain level of productivity and potentially a certain level of education. Since these abilities are unobserved, they are placed in the error term of the model. This will pose a new challenge econometrically because the correlation between schooling and the error term violate the assumption of exogeneity ($E[\varepsilon|S] \neq 0$).

These two biases have the potential to offset each other. The concluding results of OLS estimation is an overall bias but in an ambiguous direction. Many papers have discussed returns to education and estimation. Angrist and Krueger (1991) estimate using instrumental variables and OLS and conclude that the difference between IV and OLS estimates had no statistical significance. A recurrent finding of the literature on the returns to schooling is that OLS estimates are below IV estimates of returns to schooling (see Card, 1999, 2001). The estimates found in the results section are therefore less than the expected results, or underestimated.

Youths who are educated expect higher wages from both human capital and screening theory. As seen in Statistics Canada (2009), the median earnings level in Canada was \$33,834 in 2006. The paper studies the level of education and dispersion around the median income. It is found

that 31.7% of university educated people receive more than twice the median income, which is more than double the percentage of people from college and high school and trade schools in the same situation. This suggests that, for some, a university education pays off relative to the rest of the population. Although university graduates include people below the median ranges, 43% of those individuals had predominantly been doing other things than work. This suggests that working was not their main priority when the survey was taken. "Being in a situation of low earnings is largely a function of the nature of an individual's participation in the labour market" (Statistics Canada 2009, p.1). Other factors included full time and full year basis of work and being self-employed.

Returns to education have been estimated in a variety of ways. It has been shown that issues with estimation do exist and estimation results may vary from the true value. The next section will discuss an empirical study for estimating the returns to education hoping to achieve answers close to the values seen in the past literary papers. The regressions will use the basic Mincer model and the Survey of Labour and Income Dynamics data.

Data and Methodology

The source of data for the empirical analysis is the Survey of Labour and Income Dynamics (SLID). It was introduced in 1993 and produces valuable information on household and individual incomes. The survey is issued and collected at the beginning of each year from January until approximately the middle of March. Participation is voluntary and if selected, an individual is surveyed for a period of six years. It is a stratified random sample of households and individuals that attempts to mimic the entire working age population of Canada. The SLID

survey does not consider residents of the Yukon, Northwest Territories, and Nunavut. Those living in institutions, on Indian reserves and in military establishments are not accounted for in the survey as well. The survey focuses on peoples work and financial situations. Since education, family dynamics, and historical backgrounds may play a role, the survey provides information on those topics as well.

The SLID total sample includes approximately 37,000 households. It allows for comparisons of incomes between people with different education levels. It is used to provide insight on low income issues in Canada. Within the SLID survey, we can extract the age of individuals, years of completed schooling, and average yearly earnings to form our model. Education is obtained through the responses of the survey questions, while experience is measured by formula (1) shown below. As seen above in the review of literature, an earnings model is estimated by formula(2) where S represents schooling, Y represents earnings and X represents experience:

$$\text{Experience}(X) = \text{Age} - \text{Total School Years}(S) - 6 \quad (1)$$

$$\text{Ln}(Y) = \alpha_1 + \beta_1 S + \beta_2 X + \beta_3 X^2 + \varepsilon \quad (2)$$

Skills acquired and knowledge gained at educational institutions differs between individuals. A model identical to the one above can be used to gain some understanding of the observed distribution of earnings on the level of investment in human capital. This model was first introduced by Mincer (1974), and has been used many times over different time periods.

Variables are labelled as follows:

1. $Y = \text{average yearly earnings}$

2. $S = \text{total years of completed schooling}$

3. $X = \text{Number of years experience}$

The data selected is a sample of the Survey of Labour and Income Dynamics. Since we use a logarithmic earnings model, only positive earnings are used. Education takes values that are whole numbers between zero and twenty years inclusive. Experience varies according to the level of education and age. The age variable contains values from 25 to 60. Experience had values from 0 up to and including 53. Therefore the sample sizes will vary from year to year as different numbers of applicants will have positive earnings. A maximum of 700 data points are available prior to removing missing values and negative earnings. The regression is estimated for males and females between the ages of 25 and 60. The data used in the results section is from 1996, 1998, 2003 and 2009. This will allow for a comparison of four points in time over the thirteen year period. Our variables have been chosen to mimic the basic model of Mincer (1974). This model can provide insight to measure an approximate return on education. Each regression is for a one year; therefore there will be four regressions to be discussed for both males and females. Within the paper there are three tables; A, B and C. Tables A shows estimation results for 1996, table B for 1998, and table C for 2003 and 2009 together.

The model shown above is estimated for the returns to education. The estimation method used is OLS. Both human capital and signalling theories suggest that the greater the time spent on education, the greater the income associated with the higher level of education. This model assumes a constant return to education each year regardless of the duration of schooling already completed. Any fluctuations in returns to education will define decreasing, increasing or

constant returns to education over a 13 year period. Graphing the returns to education over time will provide visual evidence to support the findings of what is happening with returns to education.

Results

In 1996, the earnings regression model revealed approximately 11% returns to education for males. These results are significant at the 99.99% confidence level. Females had an estimated return of 13% in 1996, which is statistically significant at the 99.99% confidence level. As mentioned earlier, OLS estimates on the returns to estimation carry bias in an ambiguous direction but past papers have displayed a slightly downward bias on estimates suggesting that males should expect even higher returns than the estimated 11% and the same expectation is valid for the females as well. These biases will be consistent over time so the trend of returns to education will not be affected by them.

Year	Sex	Schooling	Experience	Experience ²	Sample Size	Adj. R ²
1996	Male	0.111 (5.11*10 ⁻³)	0.041 (7.66*10 ⁻³)	-6.18*10 ⁻⁴ (1.48*10 ⁻⁴)	609	0.4844
1996	Female	0.129 (6.52*10 ⁻³)	0.038 (9.49*10 ⁻³)	- 8.33*10 ⁻⁴ (1.86*10 ⁻⁴)	585	0.5094

Brackets denote standard error

In 1998, the overall return on investment in education for males was 11.2%. Men saw stable consistent returns to education over the two year span from 1996-1998. Females had a 12.7% return to education as estimated by OLS. Women continued to have stronger returns to

education relative to their male counterparts. All the results of 1998 were statistically significant to the 99.99% confidence level.

Table B						
Year	Sex	Schooling	Experience	Experience ²	Sample Size	Adj. R ²
1998	Male	0.112 (4.76*10 ⁻³)	0.043 (7.36*10 ⁻³)	-7.24*10 ⁻⁴ (1.41*10 ⁻⁴)	610	0.5429
1998	Female	0.127 (6.72*10 ⁻³)	0.0374 (9.85*10 ⁻³)	-8.179*10 ⁻⁴ (1.91*10 ⁻⁴)	582	0.4882

Brackets denote standard error

The estimated return to education for males was nearly 10% in 2003, over a full percentage point less than five years earlier. The females had an estimated return of 11.1%, a 1.5 percentage point decrease from 1998, and a continued decrease in the return to education after seven years.

Table C						
year	sex	schooling	experience	Experience ²	Sample Size	Adj. R ²
2003	Male	0.097 (4.98*10 ⁻³)	0.0455 (7.44*10 ⁻³)	-8.537*10 ⁻⁴ (1.445*10 ⁻⁴)	600	0.4773
2003	Female	0.111 (5.7*10 ⁻³)	3.01*10 ⁻² (8.15*10 ⁻³)	-5.697*10 ⁻⁴ (1.58*10 ⁻⁴)	588	0.4986
2009	Male	0.096 (4.83*10 ⁻³)	0.054 (7.33*10 ⁻³)	-1.02*10 ⁻³ (1.436*10 ⁻⁴)	571	0.4965

2009	Female	$1.676*10^{-1}$ $(6.53*10^{-3})$	$5.833*10^{-2}$ $(9.03*10^{-3})$	$-9.966*10^{-4}$ $(1.81*10^{-4})$	530	0.619
------	--------	-------------------------------------	-------------------------------------	--------------------------------------	-----	-------

Brackets denote standard error

In 2009, the most recent year tested; there were approximately 9.6% returns to education for males. The return on education for males was below 10% in the 2000's decade and around 11% in the 1990's. Females had an estimated return of 16.8%, which was a growth period in comparison with the past years in which declines were seen. All results of returns to education are significant to the 99.9% confidence level.

These empirical results ignore costs associated with extra years of schooling and therefore the actual level of these returns would be significantly lower than these estimated values. As mentioned earlier, these OLS estimates are tainted with biases and also ignore all costs associated with extra schooling. There are several costs of an extra year of education. There are opportunity costs which account for all the earnings that could have been made while not in school, direct costs, which are tuition and books and housing if necessary, and finally there are mental costs, the amount of stress and effort put into studies that are not measured in the earnings model. The following results ignore any costs incurred in obtaining extra years of education and therefore may considerably overestimate the true returns. Since this error suggest that these results are over estimates, while the other biases previously discussed may cause a slight underestimate, it may well be that they may partly cancel each other out, thereby rendering these estimates closer to the true estimated return on schooling.

The results displayed above show that education is a beneficial tool in expected earnings. As stated in human capital theory and the screening hypothesis, greater levels of education produce greater levels of earnings. Youths have access to education which provides greater future earnings potential and is a legitimate reason to leave the labour market and focus solely on schooling. Education can provide strong returns that deter youths from the labour market and direct them towards school. It has been shown that education is an alternative to the labour market for youths and males have a decreasing linear trend in returns to education which suggests that more male youths will enter the labour market. Conversely, females have an increasing linear trend on returns to education which suggests they should invest more in education.

On the issue of gender equality in the labour market, it appears that females reap the biggest rewards from investing in education. The weighted average return from education for males and females are approximately 10.4% and 13.3% respectively from the results above. These results make education a valuable commodity for youths. The youth market must take advantage of expected returns from education and invest heavily in schooling. As mentioned earlier, youths are entering the education system in higher volumes with the expectation of greater earnings later in life. If the return on education does not fall, eventually we should expect the total youth population to obtain post-secondary education, which would eliminate the wage differentials which make up the return from higher education. Also, there will be less youth employment to occupy lesser valued jobs that highly educated people would not want to do. Since those jobs have to be filled, this suggests a boom of over education if the returns

continue to rise or there exists no other return that is remotely close to the return received by education.

As shown in Figure 5, males have a negative linear trend and females have a positive linear trend for the returns to education. This suggests that there should be less males seeking further education because the rewards are becoming smaller. Females should have gains in school enrolment because the benefits of higher education are more prevalent. From this data we expect to see that youth males have growing participation rates because more males would enter the labour market instead of seeking school due to the decreasing returns to education. Females recognize that the benefits from education are growing; more females will become students to reap the rewards. This will cause a downward shift in the female youth labour force participation rate because students participate less in the labour market than non-students as shown in figure 3. Increasing returns to education promotes increases in school participation rates and decreases in labour force participation rates. Therefore from this data we expect to see male youth participation rates growing and female participation rates declining.

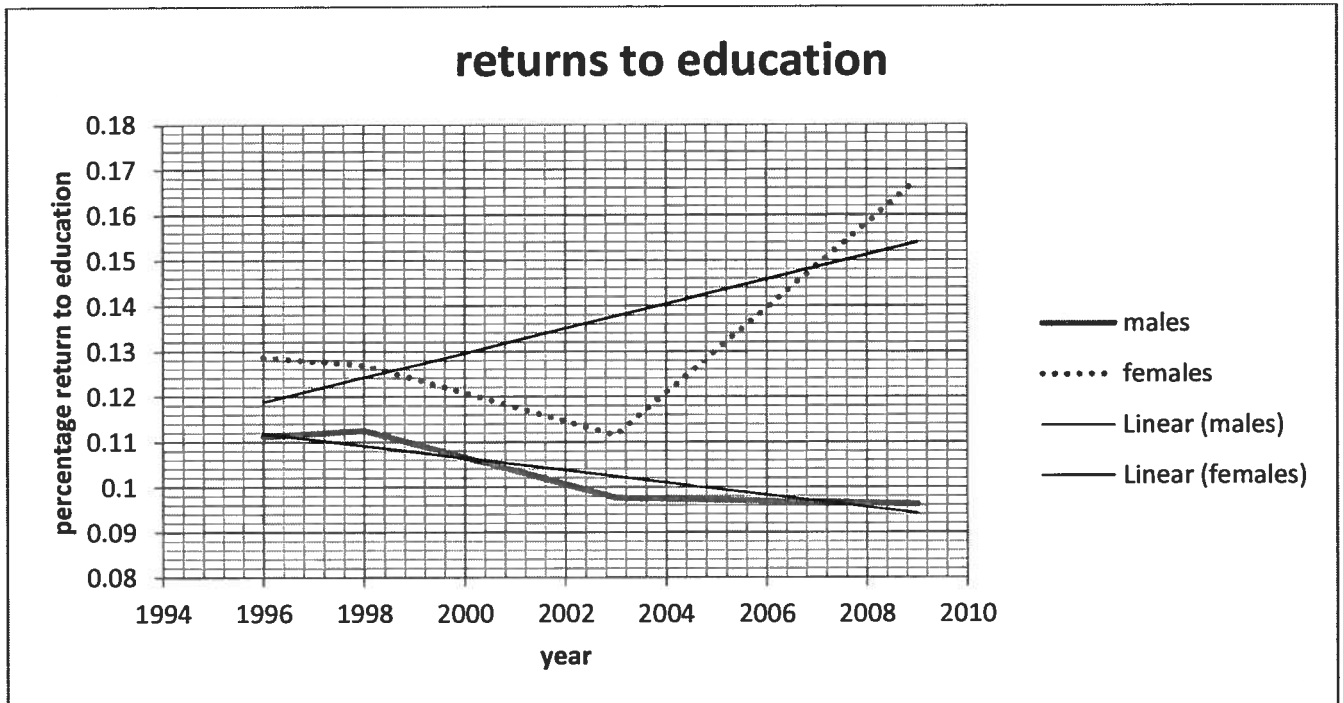


Figure 5. *Females dominate males in returns to education. Females see greater returns from education than males. Males have a decreasing linear trend in returns to education and females have an increasing linear trend over time.*

The regression also revealed significant results for work experience. For males, the average annual return to experience is 4.5% for the 4 years ignoring the experience squared coefficient. This highlights the fact that labour market experience is also a valuable trait in attempting to find higher paying jobs. The greater stock of experience you have, the greater human capital you have accumulated, and therefore a greater wage should be allotted. These results are compatible with both human capital theory and the screening hypothesis. Similarly for females, the labour market experience offered approximately 4% return on wages. Schooling was the dominant factor for males and females while experience also played a role in determining earnings differentials.

Equality in the labour market has become more prevalent in recent times. Employers are required to hire a variety of individuals that vary in sex and race. This may be one cause for the increasing return to education for women and the decreasing return to education for males. In the past, most women did not attend further education so many of the high paying jobs were obtained by men. As equality in the work place has risen, women must have an equal opportunity to men in those same high paying jobs. Therefore the return to education should rise as women achieve better jobs than the women of the past. Consequently, males see a fall in returns to education because of the loss of those higher paying jobs to females.

Summary and conclusion

This paper examined the returns to education and their effect on labour force participation of youth. It examined trends in the labour force and changes in school enrolment rates for the youth demographic group. The review of literature provided a background on returns to education and various models used in estimation. Using data from the Survey of Labour and Income Dynamics, estimates on returns to schooling were measured.

There are declines in the participation rates in the youth labour market, partially because education is becoming a more attractive alternative to the labour force. It has been shown that educational attainment is directly correlated with earnings in both human capital theory and the screening hypothesis and it is supported in the empirical results. These findings provide evidence as to why youth are selecting greater educational attainment rather than participating

in the labour market. This information also provides insight highlighting a connection between the popularity of school and the strength of the labour force participation rates.

Today's youth are becoming more aware of the economic benefits of education. It has been shown that youths experience decreases in labour force participation due to the rising student enrolment rates. Students are capable of working in the labour market but a majority chooses non-participation because education provides benefits for future income which is of greater value than the benefits of searching for a job. Although human capital and screening models differ in what they suggest for the allocation of monetary funds, both conclude that more education is connected with higher earnings. There may be issues with over education due to increases in school enrolment and economic hardship limiting job opportunities.

There have been consistent returns to education of approximately 10% for males and 12.5% for females. Women seem to have a higher return to education than men, which may be a factor in the rise in female labour force participation rates. Nevertheless, these estimates provide insight as to why there are large scale increases in student enrolment over the past decades and a lack of participation in the youth labour market. Males have a decreasing return on investment in education over time suggesting that they should perhaps be transitioning into the labour market. Females have an increasing return to education, which may advise them to leave the labour market to attend school. With returns on investment this great, the youth labour force participation rate should fall as students recognize the benefits of further education.

The youth labour market and education systems are a hot topic for policy makers. Recently, in 2006, the Ontario government introduced a “Learn until 18” Act (Van Pelt and Allison 2006), which forces student to attend school to the completion of high school or age 18. This policy enforces increases in educational attainment which provides better wages and job market success. The government is promoting higher education for the youths. Policy implications like the one discussed above offer evidence as to why the youth labour market has displayed more volatile shifts and a decreasing linear trend in labour force participation. Policy makers are enticing youths with greater opportunities and awards for further education and not pushing them into the labour market. In today’s current labour market, education is an invaluable attribute. Many jobs now require post-secondary education and the youth of tomorrow have to meet the market standard of education to find work. This policy change has reacted in a positive way towards human capital and signaling theories. Also it can play a role in the increases in student enrolment. Youths have recognized that education is the foundation for success in the labour market and are pursuing further education accordingly.

Labour force experience seems to be very important for males when it comes to yearly earnings. Females seem to benefit more from education, while work experience has little impact on the level of earnings. Both males and females recognize that returns to education offer great rewards in yearly earnings which suggest that the downward trend in the labour market may be due to the increased popularity of schooling. Males’ earnings have a stronger dependence on experience but education still offers competitive returns. As mentioned earlier, education is less available for adults relative to youths because youths can rely on parents for

living expenses. Therefore, youths should select education because it becomes less available to them as they age, while the labour market will always be available to them.

Decreases in the youth labour force participation rate can be explained partly by the strength of the returns to education and a lower reward to labour market activity in times of high unemployment, which draws individuals into the educational system. Therefore a strong return to education is one factor that can explain the decreasing trend of labour force participation in youths.

Bibliography

- Aina, Carmen and F. Pastore (2012), "Delayed Graduation and Overeducation: A Test of the Human Capital Model versus the Screening Hypothesis" IZA DP No. 6413
- Angrist, J. D. and A. B. Krueger (1991, November). "Does compulsory school attendance affect schooling and earnings?" *Quarterly Journal of Economics* 106(4), 979—1014.
- Archambault, Richard and Lewis Grignon (1999). "The Decline in the Youth Participation Rate: Structural or Cyclical?" *Canadian Business Economics, May* pg. 71-87
- Becker, Gary. S, (1975)"Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education, 2nd ed."NBER <http://www.nber.org/chapters/c3732> Accessed May 2012
- Boothby, Daniel and Torben Drewes (2004) "Post-Secondary Education in Canada: Returns to University, College and Trades Education" http://www.utoronto.ca/rdc/files/papers/Drewes_T077.0.pdf accessed August 2012
- Boothby, Daniel and Geoff Rowe (2002) "Rate of Return to Education: A Distributional Analysis Using the LifePaths Model" *W-02-8E* (online catalogue) Human Resources Development Canada
- Bourbeau, Emmanuelle, Pierre Lefebvre and Philip Merrigan (2010) "Returns to Education for 21 to 35 year-olds across Canada: Results from the 1991-2006 Canadian Analytic Censuses Files#" <http://www.er.uqam.ca/nobel/r15504/pdf>Returns%20to%20Education.pdf> accessed August 2012
- Cahuc, Pierre and Andre Zylberberg, "*Labor Economics*", (MIT press 2004), Cambridge Massachusetts, London England.
- Cameron, S. V. and C. Taber (2004, February). "Estimation of educational borrowing constraints using returns to schooling". *Journal of Political Economy* 112(1), 132—182.
- Card, D. (1995). "Using geographic variation in college proximity to estimate the return to schooling." In L. N. Christofides, E. K. Grant, and R. Swidinsky (Eds.), *Aspects of Labour Market Behaviour: Essays in Honor of John Vanderkamp*, pp. 201—222. Toronto: University of Toronto Press.
- Card, D. (1999). "The causal effect of education on earnings." In O. Ashenfelter and D. Card (Eds.), *Handbook of Labor Economics*, Volume 5, pp. 1801—1863. New York: North-Holland.
- Card, D. (2001, September). "Estimating the return to schooling: Progress on some persistent econometric problems." *Econometrica* 69(5), 1127—1160.
- Cameron, S. V. and C. Taber (2004, February). "Estimation of educational borrowing constraints using returns to schooling." *Journal of Political Economy* 112(1), 132—182.
- Dougherty, Christopher (2000) "The Impact of Work Experience and Training in the Current and Previous Occupations on Earnings: Micro Evidence from the National Longitudinal Survey of Youth"

[http://eprints.lse.ac.uk/20189/1/Impact of Work Experience and Training in the Current and Previous Occupations on Earnings Micro Evidence from the National Longitudinal Survey of Youth.pdf](http://eprints.lse.ac.uk/20189/1/Impact_of_Work_Experience_and_Training_in_the_Current_and_Previous_Occupations_on_Earnings_Micro_Evidence_from_the_National_Longitudinal_Survey_of_Youth.pdf)

Fernandes-Alcantara, Adrienne L. (May 2012) "Youth and the Labor Force: Background and Trends" Congressional Research Service, Washington.

Fortin Pierre and Mario Fortin (1999) "The Changing Labour Force Participation of Canadians, 1969-1996: Evidence From a Panel of Six Demographic Groups," *Canadian Business Economics may 1999*.

Griliches, Zvi (1977), "Estimating the returns to schooling: some econometric problems", *Econometrica* 45:1 22.

Groot, W. and H. Oosterbeek (1994), "Earnings Effects of Different Components of Schooling; Human Capital versus Screening", *The Review of Economics and Statistics*, 76 (2): 317.321.

Kane, T. J. and C. E. Rouse (1995, June). "Labor-market returns to two- and four-year college." *American Economic Review* 85(3), 600—614.

Labour Statistics Division, (2003) "The Canadian Labour Market at a Glance," <http://publications.gc.ca/Collection/Statcan/71-222-X/71-222-XIE2004000.pdf>, Accessed June 2012

Livingstone, D.W. (1997)"The Limits of Human Capital Theory: Expanding Knowledge, Informal Learning and Underemployment". Policy Options July/August 1997.<http://www.irpp.org/po/archive/jul97/livingst.pdf> Accessed July 2012

Mincer, Jacob (1974). "Schooling, Experience and Earnings" NBER book. <http://www.nber.org/books/minc74-1> Accessed July 2012

Patrinos, Henry Anthony and George Psacharopoulos (2004). "Returns to Investment in Education: A Further Update". *Education Economics, Vol. 12, No. 2, August 2004*

Psacharopoulos, G. (1985), "Returns to education: A further international update and implications" *Journal of Urban Economics*, 34: 380-400.

Rohling, Thomas. (1986). Screening and Human Capital Theory: An Empirical Test. *Industrial Relations. Vol 41. 817-826*.

Solon, G. and T. Hungerford (1987): "Sheepskin Effects in the Returns to Education", *Review of Economics and Statistics*, Vol. 69, 175-177.

Spence, M. (1973)," Job Market Signaling", *Quarterly Journal of Economics*, 87, pg. 355-374.

Staiger, D. and J. H. Stock (1997, May). "Instrumental variables regression with weak instruments." *Econometrica* 65(3), 557—586.

Statistics Canada. 1976-2012. Labour Force Survey, Jan 1976 - 2012 [public-use microdata file]. Ottawa, Ontario: Statistics Canada. Labour Statistics Division, Data Liberation Initiative [producer and

distributor]. Statistics Canada (2009) "College and university graduates with low earnings in Canada Demographic and labour market characteristics." *81-004-X Vol. 6 no. 2* (online catalogue) Accessed July 2012 <http://www.statcan.gc.ca/pub/81-004-x/2009002/article/10897-eng.htm#b>

Statistics Canada. Survey of Labour and Income Dynamics, 2009, 2003, 1998 and 1993 [Canada]: Person File [Public-use Microdata File]. Ottawa, Ontario: Statistics Canada [Producer and Distributor].

Tella, A. (1965) "Labor force sensitivity to employment by age and sex", *Industrial Relations, Vol. 4 (Feb)* pg. 69-83.

Van Pelt, A. and Derek J. Allison, (2006) "Raising Ontario's Compulsory School Attendance Age", <http://www.fraserinstitute.org/uploadedFiles/fraser-ca/Content/research-news/research/articles/OntariosCompulsoryAttendanceAge.pdf> Accessed May, 2012