

Rate of Return on a Bachelor's Degree: for Individuals and for the State

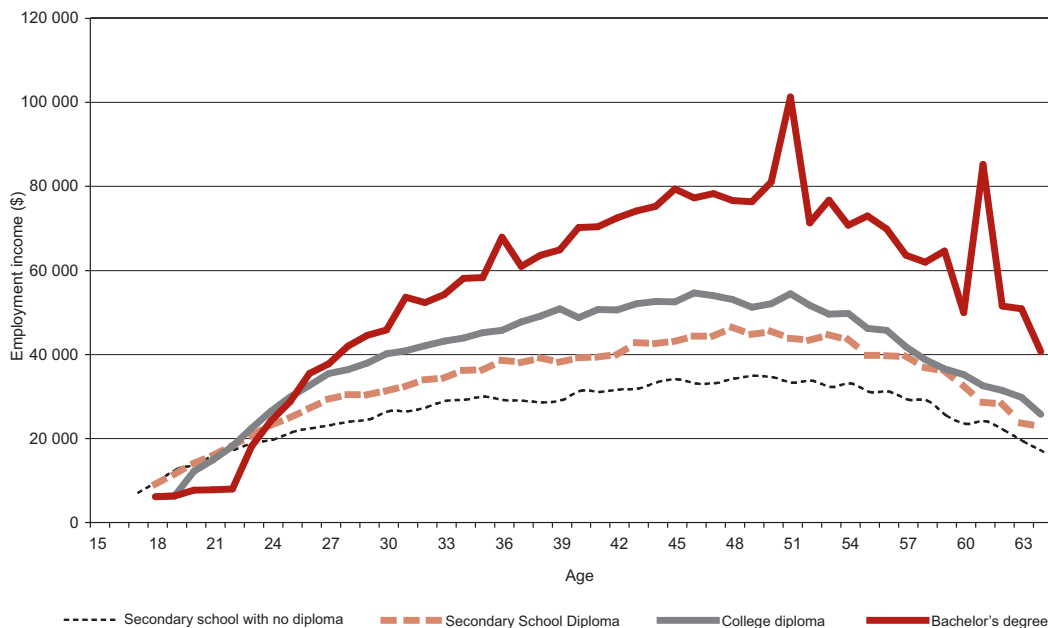
Introduction

The principal aim of this bulletin is to establish the cost-benefit relationship associated with a bachelor's degree, both for the person who has acquired a higher level of schooling and for the State, which funds the lion's share of it¹.

Comparisons of the incomes of two individuals with different levels of education generally show that the more educated person has the higher income (see Graph 1). The additional income earned by the more educated person benefits not only that individual but society as a whole, since the different levels of government collect a significant portion of this person's extra income through taxation.

Section I of this bulletin outlines the main steps involved in calculating the public and private rates of return. Section II presents the results of these calculations, including separate data for men and women. It also provides references to studies on various aspects of the return on a bachelor's degree, such as rates of return by field of study and other benefits of education. Section III highlights the relationship between unemployment rates and levels of schooling.

Graph 1 Age-income profile, according to the highest level of schooling attained by men in Québec in 2006



Source: Statistics Canada, 2006 Census. See footnote 2.

¹ This bulletin is an update of previous studies evaluating the return on education, published by the Ministère de l'Éducation, du Loisir et du Sport (MELS) and available at: <http://www.mels.gouv.qc.ca/sections/publications/index.asp?page=bullStatEducation>.

I - Calculating the Rates of Return

The main steps involved in calculating the public and private rates of return are described below.

Financial Benefits

A better picture of the increase in income that additional schooling provides can be obtained by calculating the total employment income earned by a hypothetical person who, during his or her working life (age 17 to 64), had an income stream identical to that observed in the 2006 Census data, by level of schooling and sex². For the purposes of this exercise, the total employment income earned by a bachelor's degree holder during his or her working life is calculated by adding the average annual incomes using the Census data (for bachelor's degree holders 17 to 64 years old).

Table 1 Total employment income earned by a hypothetical person during his or her working life, by level of school and sex, in Québec (\$)

Highest level of schooling	Men	Women	Together
Secondary school with no diploma	1 263 258	710 445	1 047 108
Secondary School Diploma	1 564 796	1 006 651	1 288 438
Diploma of College Studies	1 844 047	1 251 039	1 529 945
Bachelor's degree	2 584 035	1 720 766	2 166 948

Source: DRSI, MELS. Calculations based on 2006 Census data. See footnote 2.

A strong positive relationship exists between the total calculated income and the level of schooling. However, a bachelor's degree generates the greatest increase in calculated income. Thus, the total calculated income for a man with a bachelor's degree is \$2.6 million, which is over a million dollars more than for a man with only a Secondary School Diploma (in the case of a woman, the income increase is approximately \$700 000).

The additional income considered here is gross income (before taxes). As mentioned in the introduction, the tax system is such that the State collects a significant portion of the additional income earned by the more educated person. Only net additional income (after taxes) is considered for the purposes of calculating the private rate of return. For the purposes of calculating the public rate of return, the additional tax revenues are considered to be public income.

Naturally, the basic income data used to calculate the rates of return must be adjusted for certain factors.

² For the income stream associated with a Diploma of College Studies, modifications were made to Census data on the income of 18- and 19-year-olds, while for the income stream associated with a Bachelor's degree, modifications were made to the income of 18- to 22-year-olds, in order to improve the quality of the data and take into account income earned by students during the summer and school year. The data used to estimate these earnings were taken from: Ministère de l'Éducation, du Loisir et du Sport, Direction de l'aide financière aux études, *Enquête sur les conditions de vie des étudiants de la formation professionnelle au secondaire, du collégial et de l'université*, 2003.

The basic income data that will be used to determine the return on a bachelor's degree is taken from the 2006 Census and refers to income earned in the year 2005. The target population considered for the purposes of calculating the rate of return is between 17 and 85 years of age. Data on employment income was used for people between the ages of 17 and 64, whereas data on total income was used for people between the ages of 65 and 85. For the latter group, the concept of employment income is no longer relevant, since most people in this age bracket have retired from the job market.

As well, the basic data used to estimate the income stream must be readjusted to account for the expected increase in employment income. Because the Census data are "static" data (like a snapshot taken at a specific point in time), they have to be adjusted to allow for future growth in the real productivity of the economy. The calculation of the rate of return on education presumes a growth rate of 1% per year in real employment income³.

The estimate of the total income and other taxes paid by a given person is based on an estimate of the average tax rates associated with the different levels of income. These tax rates take account of income tax, taxes on social security, property tax and corporate tax, as well as various taxes on goods and services⁴.

Table 2 shows the total income and other taxes that a hypothetical person, male or female, with a given level of schooling, would have paid during his or her working life (from 17 to 64 years of age), if his or her employment income stream had been identical to that calculated using the 2006 Census data. The figures in parentheses indicate the average tax rates.

It appears that the different levels of government collect a significant portion of employment income and that this portion increases with the education level of the individual being considered. A man with a bachelor's degree pays a total of \$1.2 million in income and other taxes, which is over \$600 000 more than the total calculated for a secondary school graduate (the corresponding difference for women is about \$400 000).

Table 2 Total income and other taxes paid by a hypothetical person during his or her working life, by level of schooling and sex (\$)

Highest level of schooling	Men	Women	Together
Secondary school with no diploma	390 696 (31)	172 612 (24)	271 766 (26)
Secondary School Diploma	541 954 (35)	265 682 (26)	412 375 (32)
Diploma of College Studies	735 130 (40)	389 909 (31)	536 856 (35)
Bachelor's degree	1 155 768 (45)	667 043 (39)	916 043 (42)

Source: DRSI, MELS. Calculations based on 2006 Census data and a special compilation by the Fraser Institute.
 N. B.: The data in parentheses indicate the average tax rates.

³ Income increases stemming from inflation can be expected, but these will not be taken into account. The Census data make it possible to estimate the value of the differences in real income, if it is assumed that future inflation will not affect the gap in real income between individuals with the levels of schooling under consideration. In actual fact, inflation will have an effect in this regard. All things being equal, it would widen the differences in real income to the extent that more educated individuals have more protection against inflation.

⁴ Source: The Fraser Institute. Special compilation for Québec (estimates for 2008).

Once the age-income profiles are defined for hypothetical individuals with different levels of schooling, the amount of additional net income earned by the more educated individuals can be determined and must then be compared with the private costs of education. For the purposes of calculating the public rate of return, the additional tax revenues must be compared with the public cost of education.

For the purposes of calculating the rates of return, two types of individuals were considered: those with a Secondary School Diploma and those with a bachelor's degree.

The Private Cost of Education

The expenses incurred by students (or their parents or sponsors) include tuition and other fees required by educational institutions, additional school-related costs and loss of earnings. However, the value of grants as well as tax exemptions obtained by students (or their parents or sponsors) must be subtracted from this amount. These cost elements are described in greater detail below.

Tuition and other fees paid to the institutions include the sums paid by students for educational services, admission and registration fees, contributions made for various services offered by the institution and other related fees.

During their studies, students will also face additional school-related costs. These consist of additional costs relative to what individuals would have to spend if they were working. School supplies and books are examples of such expenses.

However, the greatest expense that students incur in obtaining additional education is the loss of earnings. When individuals who are able to work decide to pursue their studies, they must accept a reduction in their present income in the hope that increased earning power in the future will more than compensate for their current loss. The estimated loss of earnings is based on the difference between the net income of workers with a Secondary School Diploma and the net income of students of the same age. The employment income earned by students is derived from summer jobs or part-time jobs during the school year.

What must be taken into account, however, is the fact that the government provides students (or their parents) with direct financial assistance, which helps reduce the private cost of education. The financial assistance considered here consists of student grants and tax exemptions. The amount of government financial assistance must, therefore, be subtracted from the total estimated private cost.

To begin with, determining the total private cost of education involved estimating the per-student expenditure for the cost elements considered and for each year of education (pre-university college education and university education). An adjustment factor is applied to take into account the fact that the actual amount of time required to complete a course of study may be longer than the time set out in the program calendar⁵.

The private cost of educating a Secondary School Diploma holder until he or she earns a bachelor's degree is estimated to be approximately \$55 000 per male and \$40 000 per female. This cost is higher for a man because of the greater loss in income, and also because the actual amount of time required to complete a course of study is slightly longer for a man than for a woman.

⁵ The actual amount of time required to complete a course of study is longer than the theoretical duration for several reasons, including repeating a failed course or changing academic programs in midstream.

The Public Cost of Education

Here, the aim is to determine what it costs the different levels of government when a person with a given level of schooling seeks to attain a higher level of education. Only public education expenditures are considered in this case. The share of expenditures financed by tuition fees or any other source of private funding is not taken into account.

The concept of expenditure used here refers to overall expenditures allocated to postsecondary education⁶ and includes the operating and capital expenditures of educational institutions, the cost of student financial assistance and the management expenses of the Ministère de l'Éducation, du Loisir et du Sport (the portion attributable to postsecondary education). These expenditures must, however, include the loss in tax revenues suffered by the various levels of government.

The loss in government tax revenues results from the foregone tax revenues and the public cost of the various tax exemptions granted to students or their parents⁷.

As regards the foregone tax revenues, consider that when a person decides to pursue his or her studies rather than seek gainful employment, the government also suffers a loss in tax revenues for the duration of the person's studies. Like government education grants, these foregone tax revenues must be accounted for since they too represent a public cost linked to higher education.

The foregone tax revenues are estimated by calculating the difference between the income and other taxes that a given person would have paid had he or she decided not to pursue his or her studies, and the income and other taxes paid by that person as a student.

To determine the total public share of what it costs for Secondary School Diploma holders to obtain a bachelor's degree, it was necessary to first estimate the per-student expenditure for the cost elements considered and for each year of education (pre-university college education and university education). An adjustment factor is applied to take account of the fact that the actual amount of time required to complete a course of study may be longer than the time set out in the program calendar⁸.

To educate a Secondary School Diploma holder until he or she earns a bachelor's degree, it costs the different levels of government a total of approximately \$102 000 per male and approximately \$92 000 per female. This cost is higher for a man because of the greater loss in tax revenues, but also because the actual amount of time required to complete a course of study is slightly longer for a man than for a woman.

The Rate of Return

The principal aim of calculating the costs and benefits involved in educating a Secondary School Diploma holder until he or she earns a bachelor's degree is to establish a cost-benefit ratio that will serve as an indicator of the return on investment made in education. An uninformed reader might be tempted to make a direct comparison between the benefits calculated earlier and the costs of education. However, the benefits and the costs are spread out over a number of years, and this must be taken into account in determining the return on an investment. Thus, today's return on an investment does not have the same value as the return that will be earned in 10 years. The more time it takes for an investment to yield a return, the less value it has in the present.

6 Subsidized research is excluded.

7 This estimate of the cost of the various tax exemptions as well as the additional cost for a student (an element of the private cost) is based on the work of Professor Clément Lemelin (Université du Québec à Montréal). He is the author of the book *L'économiste et l'éducation*, Presses de l'Université du Québec, 1998.

8 See footnote 5.

One way to compare the costs and benefits is to determine the rate of internal return that makes the current value of the stream of additional income equal to the current cost of education (the net current value is equal to zero). This was the calculation method used to calculate the rate of return associated with a bachelor's degree. This rate of return is equivalent to a real interest rate obtained on an investment (nominal interest rate minus inflation rate).

II - Results

Table 3 presents the results obtained after calculating the public and private rates of return for a given person with a Secondary School Diploma who pursues and obtains a bachelor's degree.

Table 3 Private rate of return and public rate of return in 2005-2006 (%)

	Men	Women	Together
Private rate of return	10.2	12.6	10.6
Public rate of return	8.7	8.4	8.5

Source : DRSI, MELS.

In 2005-2006, the private rate of return was 10.6%, i.e. 10.2% for men and 12.6% for women. The higher private rate of return for women can be explained primarily by the fact that their education costs less.

The public rate of return was 8.5%; it was slightly higher for men (8.7%) than it was for women (8.4%). Although the public cost of education was lower for women than for men⁹, the additional fiscal benefits obtained from male bachelor's degree holders more than compensate for the differences in cost¹⁰.

Moreover, the public rate of return was lower than the private rate of return, although a previous study (based on 2000-2001 data) had found the overall public rate of return (10.9 %) to be slightly higher than the private rate of return (10.5 %)¹¹. This decrease in the public rate of return can be explained by higher costs relative to benefits between the two years considered.

This rise in costs can be explained mainly by the sharp increase (27%) in per-student spending by universities between 2000-2001 and 2005-2006. It should be remembered that, in Québec, universities receive a significant share of public funding¹².

A cut in average tax rates for bachelor degree holders was another factor that decreased the public rate of return between 2000-2001 and 2005-2006¹³.

9 The difference between public education costs is nonetheless lower than the difference between private education costs.

10 The fact that tax rates increase with income level (progressive rates) partly explains the higher public rate of return in the case of men.

11 See the *Education Statistics Bulletin* published by the Direction de la recherche, des statistiques et de l'information of the Ministère de l'Éducation, du Loisir et du Sport: Marius Demers, *The Return on a Bachelor's Degree*, no. 32, September 2005.

12 See the *Education Statistics Bulletin* published by the Direction de la recherche, des statistiques et de l'information of the Ministère de l'Éducation, du Loisir et du Sport: Marius Demers, *Financial Investment in Universities in 2006-2007: Comparison Between Québec and the Other Canadian Provinces*, no. 37, August 2008.

13 It should be remembered that this study uses average tax rates based on 2008 data, while the previous study used 2003 data. The lower average tax rates reflect a decrease in the GST rate at the federal level (from 7% to 5%) and income tax cuts at the provincial level, among other things.

However, a comparison of the results of this study with those of the study for 2000-2001 reveals that the private rate of return has remained relatively stable: 10.6% in 2005-2006 versus 10.5% in 2000-2001. Students have been less affected by rising education costs than universities¹⁴ and have benefited from tax rate cuts.

Despite the decline in the public rate of return, a bachelor's degree is still a very worthwhile investment for both the State and the individuals who attain a higher level of schooling.

Note that the calculations for the rates of return take into account the actual time required to complete a course of study¹⁵. For students who obtain their degree in the minimum amount of time, the public and private rates of return are nearly one percentage point higher than those indicated in Table 3. The impact of delays and program changes is therefore significant.

Although the rates of return are average rates, calculated for all students and all fields of study, they do vary, depending on the individual and the field of study. In the previous study, data were provided by field of study, based on a study by Human Resources Development Canada¹⁶.

Aside from the financial return taken into account in calculating the rates of return, there are public and private benefits to additional education besides increased income. From the viewpoint of society, educated individuals are less burdensome in terms of their use of public services (welfare or costs related to crime). There is also a positive relationship between the health status and level of schooling of those considered¹⁷.

University graduates enjoy other benefits as well, specifically with respect to health, lifestyle and the quality of their employment status. One of the major benefits noted was the ability of people with higher education to obtain relatively more stable employment, which makes them less susceptible to unemployment.

¹⁴ This can be explained in part by the tuition fee freeze for Québec residents for the period under study.

¹⁵ See footnote 5.

¹⁶ Daniel Boothby and Geoff Rowe, *Rate of Return to Education: A Distributional Analysis Using the LifePaths Model*, June 2002.

¹⁷ These issues were covered in previous bulletins on the return on education. See also OECD, *Education at a Glance 2006*, Indicator A10, "The returns to education: Links between education, economic growth and social outcomes."

III - Unemployment Rates and Levels of Schooling

Generally speaking, there is a strong correlation between unemployment rates and education: the more educated the person, the less likely that person is to be unemployed. Table 4 shows average unemployment rates in 2006 for people in Québec, according to sex and the highest level of schooling attained. The data are taken from the 2006 Census.

Table 4 Unemployment rate according to highest level of schooling attained in 2006 (%)

Highest level of schooling attained	Men	Women	Together
No certificate, diploma or degree	12.3	13.1	12.6
Secondary School Diploma	7.6	6.9	7.3
Diploma of College Studies	5.5	4.8	5.1
Bachelor's degree	4.8	4.6	4.7
Diploma in medicine, dentistry, veterinary medicine or optometry	1.8	3.1	2.4
Master's degree	5.3	4.9	5.1
Doctorate (Ph.D)	4.0	3.6	3.9
Total	7.4	6.5	7.0

Source: DRSI, MELS. Calculations based on 2006 Census data.

Unemployment rates are particularly high among those who failed to complete secondary school. The unemployment rate is considerably lower (7.3% in 2006) among those who graduated with a Secondary School Diploma.

Of course, the lowest unemployment rates are observed among those with postsecondary education. The unemployment rate is 5.1% among college graduates, 4.7% among holders of bachelor's degrees, 5.1% among those with Master's degrees, and 3.9% among those with a doctorate.

Note that for the levels of schooling considered, unemployment rates among men are generally slightly higher than those among women. Overall, the unemployment rate among men (7.4%) is almost one percentage point higher than the unemployment rate among women (6.5%). However, a lower unemployment rate among women does not mean that their employment status is better than that of men. More women than men face precarious job situations, and they are underrepresented in certain occupations. However, it seems that women's employment situation has improved over the past few years¹⁸.

These unemployment rates cover the total labour force over 15 years of age. However, as expected, unemployment rates vary considerably when data from different age groups are compared. Graph 2 illustrates the relationship between average unemployment rates per age group and highest level of schooling.

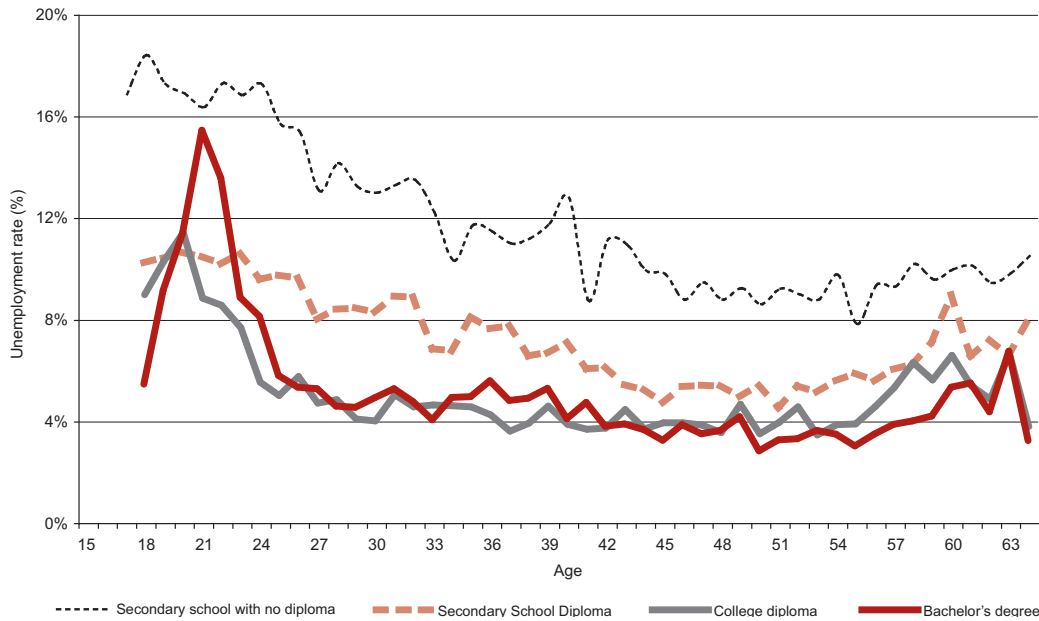
This graph shows that the relationship between unemployment rates and level of schooling is consistent for every age group and overall: the higher a person's level of schooling, the less likely he or she is to be unemployed.

¹⁸ See the following publications:

- Institut de la statistique du Québec, *La qualité de l'emploi au Québec : développements conceptuels et création d'une typologie - État actuel de la réflexion*, Direction des statistiques du travail et de la rémunération, October 2008.
- Luc Cloutier, *Effets de certaines politiques sociales sur la qualité de l'emploi des femmes au Québec*, Bulletin Flash-Info Travail et rémunération, vol. 8, no. 3, Institut de la statistique du Québec, p. 1-5, September 2007.

Note also that the more educated individuals are, the more likely they are to find it easy to break into the job market and to hold jobs that are both more interesting and more stable. University graduates also have the advantage of being able to hold jobs that offer more autonomy and opportunities for advancement¹⁹.

Graph 2 Unemployment rate according to age group and highest level of schooling attained in 2006



Source: DRSI, MELS. Calculations based on 2006 Census data.

Conclusion

When the additional income made possible by a bachelor's degree is compared with the private cost incurred by a person in order to acquire additional education, the bachelor's degree appears to be a very worthwhile investment. However, the private rates of return calculated are average rates and, as mentioned earlier, can vary considerably depending on the individual and the field of study.

Although the public rates of return are high, they are lower than the private rates of return and than previous rates of return. This decline is partly the result of increased costs relative to benefits in recent years. While per-student spending by universities has risen sharply in the past few years—a significant factor since Québec universities receive a large part of their revenue from public funds—bachelor degree holders have benefited from cuts in average tax rates.

Although this study is based on monetary considerations, there are also significant nonmonetary advantages to obtaining a bachelor's degree.

¹⁹ See: George Butlin and Jillian Oderkirk, *Educational Attainment: A Key to Autonomy and Authority in the Workplace*, Quarterly Education Review, Statistics Canada, vol. 4, no. 1, 1997.

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