

## RETURNS TO EDUCATION

### International and National Evidence

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#### *Introduction*

The concept of “human capital” was introduced and developed in the 1960s by two Nobel Laureate economists, Theodore W. Schultz and Gary Becker<sup>1</sup>, in discussing the concept that individuals acquire skills and abilities to increase their labour market value. In essence, this approach considered experience, training and education as mechanisms for increased productivity and output capacity in individuals. Further work in the area led to the concept that, as in the case of physical capital or the produced means of production, it would be possible to calculate the returns to human capital or the rate at which productivity is increased because of some human capital acquisition, such as education.

Elaboration on this concept identified returns to individuals from the acquisition of human capital (private returns) as well as returns to the broader society through economic growth and higher overall productivity (public returns), prompting discussion of the concept of human capital as a “public good” worthy of government intervention and/or production.

Since that time, there have been a number of attempts to estimate the private and public returns to education. This paper will focus on some of the more recent studies to identify the private and public returns to education. This will allow an understanding of the impact of education on the individuals being educated and on the societies supporting the education process.

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<sup>1</sup> Theodore W. Schultz, “Investment in Human Capital,” *The American Economic Review* 51, no.1 (March 1961), p. 1-17 and Gary S. Becker. *Human Capital*, National Bureau of Economic Research, New York, NY, 1964.

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## International Evidence

In 1985, George Psacharopoulos published a study of the returns to education in over 60 countries around the world, using data from other studies conducted by a number of academics during the previous three decades.<sup>2</sup> This work was further updated in 1994<sup>3</sup> and, most recently, in 2002, in a working paper for The World Bank.<sup>4</sup> In this latest study, Psacharopoulos and Patrinos reported on the social or public and private rates of return for various levels of education found by a large number of research projects in more than 80 countries around the world. The results of this study are shown in Table 1, below.

**Table 1: Returns to Investment in Education by Level of Education, (per cent)**

	Social Returns			Private Returns		
	Primary	Secondary	Higher	Primary	Secondary	Higher
<b>World Average</b>	18.9%	13.1%	10.8%	26.6%	17.0%	19.0%
<b>Highest</b>	66.0%	47.6%	24.0%	99.0%	52.1%	56.0%
<b>Lowest</b>	2.0%	2.2%	-4.3%	1.9%	3.1%	4.2%
<b>Canada (1994)</b>					7.8%	13.0%

Source: Psacharopoulos and Patrinos, 2002.

Psacharopoulos has noted that these percentages represent internal rates of return on education spending.<sup>5</sup> They can be interpreted as the rate of return (in per cent) for every dollar spent on a particular type of education. From Table 1, for example, the 2002 report suggests that every dollar of public funds spent on primary education in the world returns an earnings of 18.9 per cent per year. Social rates of return do not include social benefits or externalities that cannot be evaluated in financial terms. Private rates of return represent the earning potential of money spent by individuals on their own education; it averaged 26.6 per cent per year to the individuals being educated.

The Psacharopoulos and Patrinos study reveals that there is a very wide range of returns from education, with social returns ranging from a low of -4.3 per cent for higher education in Zimbabwe to a high of 66.0 per cent for primary education in Uganda. Private returns also vary widely, ranging from a low of 1.9 per cent for primary education in Turkey to a high of 99.0 per cent for primary education in Botswana and Liberia. Private rates of return for Canada were calculated only for secondary and “higher” education, at 7.8 per cent and 13.0 per cent respectively, slightly below the world average in each case.

<sup>2</sup> George Psacharopoulos, “Returns to Education: A Further International Update and Implications”, *The Journal of Human Resources* vol. XX, No. 4, p. 583-604.

<sup>3</sup> George Psacharopoulos, “Returns to Investment in Education: A Global Update”, *World Development*, Volume 22, Issue 9, September 1994, p. 1325-1343.

<sup>4</sup> George Psacharopoulos and Harry A. Patrinos, “Returns to Education: A Further Update” (September 2002). World Bank Policy Research Working Paper No. 2881.

<sup>5</sup> George Psacharopoulos, “The Profitability of Investment in Education: Concepts and Methods”, The World Bank, Human Capital Development and Operations Policy Working Paper 63, 1995.

The results from this study confirmed expectations that social rates of return from education tend to fall as education levels rise (as do private rates of return) except for advanced education levels. The study also found that rates of return tend to fall as country wealth increases, consistent with the lower-than-average rates of return noted in Canada.

The study also examined rates of return to education by gender and found that, while the rate of return to education was higher overall for women (9.8 per cent) as compared to men (8.7 per cent), the higher rate of return for women was only present in the case of secondary education, with men experiencing higher rates of return for both primary and “higher” education spending.<sup>6</sup>

Psacharopoulos and Patrinos have also calculated the impact of an additional year of education on individuals’ earnings. This is known as the “Mincerian” method, which was named for Jacob Mincer who pioneered the approach in 1974.<sup>7</sup> While it has the advantage of not requiring an estimation of the cost of education, it does not provide any indication of the social or public returns to education because it is simply limited to estimating the extent to which additional education will affect the incomes of the educated. The results of that calculation are shown in Table 2, below.

**Table 2: Mean Rate of Return to Years of Schooling (per cent)**

	<b>Mincer Coefficient (per cent)</b>
<b>World Average</b>	9.7%
<b>National Income</b>	
<b>High</b>	7.4%
<b>Medium</b>	10.7%
<b>Low</b>	10.9%
<b>Highest (Jamaica)</b>	28.8%
<b>Lowest (Italy)</b>	2.7%

Source: Psacharopoulos and Patrinos, 2002.

In this case, it can be seen that, on average in the world, an additional year of education will raise an individual’s annual income by 9.7 per cent. Returns tend to be higher in low-income countries (10.9 per cent) than in high-income countries (7.4 per cent), which is consistent with the concept of decreasing returns on education. There also seems to be substantial variation in returns to additional schooling, with Jamaica experiencing the highest returns (28.8 per cent per year of schooling) and Italy having the lowest returns on schooling (2.7 per cent).

<sup>6</sup> George Psacharopoulos and Harry A. Patrinos, *op cit*, p. 15.

<sup>7</sup> *Ibid.*, p. 7.

The Organization for Economic Co-operation and Development (OECD) releases regular studies on various indicators of economic and social performance among its member countries and publishes an annual report on education activities within OECD countries. The 2006 annual report, *Education at a Glance*, was released in September 2006<sup>8</sup> and examines the rates of return to “upper secondary and post-secondary, non-tertiary education” (ISCED 3/4) and “university-level degree” (ISCED 5/6) programs in education.<sup>9</sup> This distinguishes the rates of return for those who achieve senior matriculation and some (non-university degree) education from those who receive university degrees. The results of this study, for individuals who moved directly from one level of education to the next, are shown in Tables 3 and 4, below.

**Table 3: Private Returns to Education by Level and Gender, 2003 (per cent)**

	Private Return to ISCED 3/4		Private Return to ISCED 5/6	
	Males (%)	Females (%)	Males (%)	Females (%)
<b>Belgium</b>	14.3%	11.9%	10.7%	15.2%
<b>Denmark</b>	na	na	8.3%	8.1%
<b>Finland</b>	na	na	16.7%	16.0%
<b>Hungary</b>	9.7%	11.3%	22.6%	15.0%
<b>Korea</b>	13.5%	6.6%	12.2%	14.9%
<b>New Zealand</b>	14.1%	16.2%	9.3%	12.9%
<b>Norway</b>	na	na	12.1%	15.7%
<b>Sweden</b>	na	na	8.9%	8.2%
<b>Switzerland</b>	7.9%	8.3%	10.0%	9.8%
<b>United Kingdom</b>	25.1%	29.9%	16.8%	19.6%
<b>United States</b>	na	na	14.3%	13.1%
<b>Average*</b>	14.1%	19.0%	12.9%	13.5%

\* Simple, not weighted average.

na – not available.

Source: OECD, *Education at a Glance*, 2006.

As with the earlier study, these data suggest there is considerable variation in private returns to education between countries and between types of education. In this case, the private returns on investment in upper secondary or post-secondary, non-tertiary (ISCED 3/4) education provided a return on investment between a low of 6.6 per cent for Korean women and a high of 29.9 per cent for women in the United Kingdom. The simple average private rate of return was 14.1 per cent for men and 19.0 per cent for women on this type of education.

The private rates of return from university degrees (ISCED 5/6) averaged 12.9 per cent for men and 13.5 per cent for women in the eleven countries surveyed by the OECD. There was somewhat more consistency in the private returns for university degrees than was the case for

<sup>8</sup> Organization for Economic Co-operation and Development, *Education at a Glance*, 2006, Organization for Economic Co-operation and Development, 2006.

<sup>9</sup> *Ibid.*, p. 120-151.

other post-secondary education but, nevertheless, the private rates of return ranged from a low of 8.1 per cent for women in Denmark to a high of 22.6 per cent for men in Hungary.

The OECD study also examined public rates of return on education at both the upper secondary or post-secondary, non-tertiary (ISCED 3/4) and the university degree (ISCED 5/6) levels and these data are shown in Table 4, below.

**Table 4: Public Returns to Education by Level and Gender, 2003 (per cent)**

	Public Return to ISCED 3/4		Public Return to ISCED 5/6	
	Males (%)	Females (%)	Males (%)	Females (%)
<b>Belgium</b>	11.3%	9.2%	12.2%	17.9%
<b>Denmark</b>	14.3%	11.6%	7.8%	6.9%
<b>Finland</b>	9.8%	6.7%	13.6%	11.3%
<b>Hungary</b>	6.7%	8.2%	18.8%	13.1%
<b>Korea</b>	6.7%	3.2%	14.2%	16.8%
<b>New Zealand</b>	8.3%	5.4%	9.9%	9.9%
<b>Norway</b>	7.5%	5.2%	9.5%	9.9%
<b>Sweden</b>	13.2%	10.2%	7.5%	6.3%
<b>Switzerland</b>	1.9%	3.2%	6.3%	5.8%
<b>United Kingdom</b>	13.8%	11.1%	13.7%	16.1%
<b>United States</b>	13.3%	10.5%	14.1%	13.0%
<b>Average*</b>	9.7%	7.7%	11.6%	11.5%

\* Simple, not weighted average.

Source: OECD, *Education at a Glance*, 2006.

The public rates of return to expenditures on upper secondary or post-secondary, non-tertiary (ISCED 3/4) education averaged 9.7 per cent for males and 7.7 per cent for females. At the university degree level, the public rates of return were 11.6 per cent and 11.5 per cent, respectively for males and females. The public rates of return to education have tended to be more closely grouped around the averages than was the case for private rates of return in Table 3.

The fact that estimated rates of return to education spending have tended to be higher for private returns than for public returns and that public rates of return have been higher for men than for women have both been taken to imply certain policy prescriptions for the public funding of education.

## Canadian Evidence

Francois Vaillancourt<sup>10</sup> estimated the returns to education using data on 1985 earnings in Canada. In this study, Vaillancourt identified the returns by gender and by level of education as well as by field of study for higher education. The estimated rates of return by level of education are shown in Table 5, below.

**Table 5: Private and Total Rates of Return by Level of Education\* and Gender, Canada, 1985**

	Men		Women	
	Private Return (%)	Public Return (%)	Private Return (%)	Public Return (%)
<b>Secondary</b>	20.7%	10.6%	18.6%	6.1%
<b>College</b>	6.6%	-2.0%	17.3%	6.1%
<b>Bachelor's</b>	8.3%	4.3%	18.8%	8.4%
<b>Master's</b>	6.5%	2.4%	0.1%	-4.9%
<b>PH D</b>	1.2%	-2.3%	16.3%	2.5%

\*In each case, the rate of return is calculated relative to the immediately prior level of education. For example, the rate shown for secondary education is relative to primary education.

Source: Francois Vaillancourt, 1995, p. 548.

From this study, it appears that the rates of return to education were lower in Canada than has generally been experienced elsewhere, which may be consistent with the tendency for returns to fall with economic development. It is also true that rates of return in Canada appear to fall with level of education, again consistent with experiences elsewhere. Public returns in Canada also appear to be less than the private rates of return, as has been the experience elsewhere. Private returns to secondary education seem to be higher in Canada than was the case in the OECD study above, although still well within the range experienced in the OECD. In the Vaillancourt study, public returns to education in men exceeded those for women at the secondary level but the public returns for women exceeded those for men at all other levels of education. These results are not consistent with the results from the OECD study of other countries.

As mentioned, the Vaillancourt study also estimated the public and private rates of return to education at the bachelor's level in Canada by field of study as shown in Table 6, on the following page.

<sup>10</sup> Francois Vaillancourt, "The Private and Total Returns to Education in Canada, 1985", *Canadian Journal of Economics* vol. XXVIII, No. 3, August, 1995, p. 532-54.

**Table 6: Private and Total Rates of Return for Bachelor's and Health Degrees\* by Field of Study and Gender, Canada, 1985**

	Men		Women	
	Private Return (%)	Public Return (%)	Private Return (%)	Public Return (%)
<b>Education</b>	9.8%	5.8%	16.3%	8.5%
<b>Humanities</b>	0.7%	-0.7%	5.5%	1.9%
<b>Social Sciences**</b>	10.8%	8.8%	16.3%	8.5%
<b>Commerce</b>	19.6%	13.5%	23.9%	11.9%
<b>Natural Sciences</b>	10.6%	5.9%	16.3%	5.1%
<b>Engineering</b>	23.0%	11.7%	16.0%	5.1%
<b>Health Sciences</b>	9.2%	-0.7%	26.6%	3.0%
<b>Health Degree***</b>	30.8%	9.3%	28.8%	6.8%

In each case, the rate of return is calculated relative to the immediately prior level of education. For example, the rate shown for bachelor's degrees is relative to completed secondary education.

\*\* Includes law degrees.

\*\*\* Includes MD, DDS and DVM.

Source: Francois Vaillancourt, 1995, p. 549.

These data reveal that, in all cases, the private rate of return is estimated to exceed the public rate of return at the bachelor's and health degree level. The private returns for men exceed those for women in degrees in engineering and health; otherwise, the private returns to women are estimated to exceed those to men. In the case of estimated public rates of return, returns are actually negative for men in humanities and health sciences but exceed those for women in all other disciplines except education. Women do not produce negative returns on education in any category, although the public rates of return are very low in both humanities and health sciences.

In January 2004, TD Economics reported on a survey of Canadian research on the returns to education to ascertain whether education remained a worthwhile investment for individuals.<sup>11</sup> This survey examined the work of other researchers and provided estimates of returns to education as shown in Table 7, on the following page.

<sup>11</sup> TD Economics, "Investing in a Post Secondary Education Delivers a Stellar Rate of Return", TD Economics Topic Paper, TD Financial Group, January 22, 2004, available at [www.td.com/economics](http://www.td.com/economics).

Table 7: Return to Post-Secondary Education in the 1990s

	<b>Private Rate of Return (%)</b>
<b>University</b>	12-20%
- Men	12-17%
- Women	16-20%
<b>College</b>	15-28%
- Men	15-28%
- Women	18-26%

Source: TD Economics, 2004, p.1.

The survey by TD Economics concludes that “[t]he fantastic value of a post-secondary education, with a real after-tax annual return of more than 12 per cent, is simply too good to pass up.”<sup>12</sup>

A similar, more extensive survey of the research was conducted by Herb Emery of the University of Calgary in 2004, and reported on 21 studies published between 1968 and 2002 on the total rates of return to university degrees.<sup>13</sup>

In this report, Emery examined the studies that had been done on rates of return to university degrees over time and performed regression analysis to find whether there had been a discernible trend in rates of return to education over an extended period in Canada. The results of this analysis are illustrated in Figure 1, on the following page.

Figure 1 illustrates that, for both males and females, the total returns to university degrees have been estimated to be below the private rates of return throughout the period. Similarly, the private rates of return to university degrees for men were estimated below the rates of return for women throughout the period.

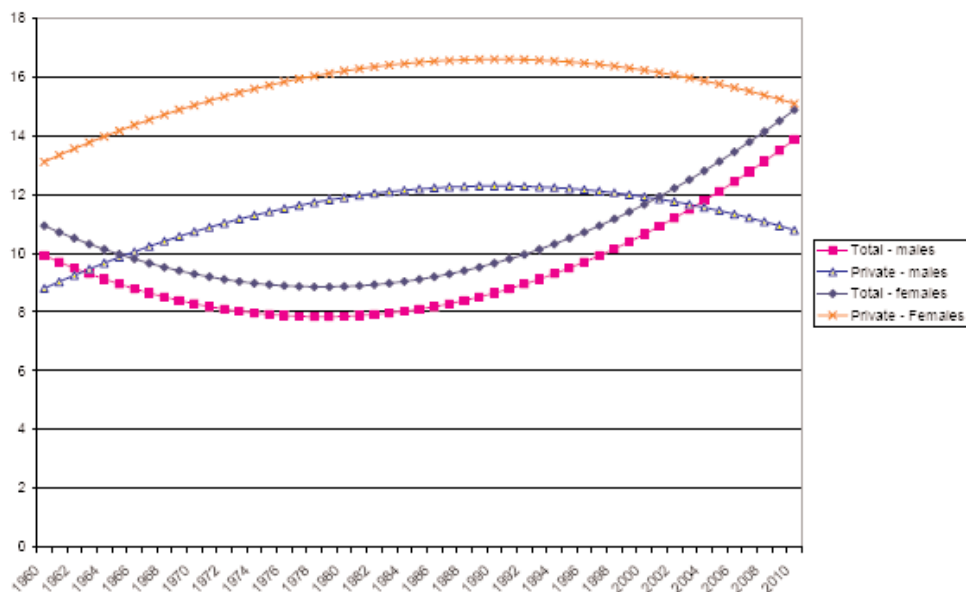
The trend lines revealed in the survey of studies suggested that private rates of return to university degrees rose fairly consistently for both men and women between 1960 and the early 1990s, when they peaked at over 16 per cent for women and over 12 per cent for men, before slowly falling to levels of about 15 per cent for women and 11 per cent for men.

The Emery paper also notes that total returns to university degrees followed a mathematically complementary path, as one might expect, falling between the 1960s and the 1990s before beginning to rise in the late 1990s. Emery’s analysis suggests that total returns to education will exceed private returns in the case of men beginning in 2005, but the same cross-over will not occur for women until about 2010.

<sup>12</sup> *Ibid.*, p.3.

<sup>13</sup> Herb Emery, “Total and Private Returns to University Education in Canada: 1960-2030 and in Comparison to other Post-secondary Training”, in Charles M. Beach, Robin W. Boadway and R. Marvin McNinn (eds.), *Higher Education in Canada*, John Deutsch Institute, 2005, p. 77-112.

**Figure 1: Private and Total Returns to University Degrees in Canada, 1960 to 2010 (per cent)**



Source: Herb Emery, 2005.

Another significant analysis of private rates of return to education was conducted by Jorgen Hansen of Concordia University under contract to Human Resources and Social Development Canada (HRSDC). This analysis was published in September 2006.<sup>14</sup> This study estimated the rates of return at three points in time (1991, 1996 and 2001), for ten fields of study at the bachelor's level and for four regions of Canada. The study also provided estimates of rates of return by gender to allow comparisons between women and men.

In the Hansen study, the results are illustrated as calculated internal rates of return (IRR), which are the discount rates that would apply to reduce an anticipated future stream of income or benefits (in this case, future income advantages from education) to the level of costs of production. Positive IRR indicate that, allowing for time, financial rewards exceed the cost. Negative IRR indicate that costs exceed rewards once the time of repayment is considered. IRR are often compared to interest rates to determine worthiness of an investment project.

Rates of return for women and men, by field of study, are illustrated in Table 8, on the following page.

<sup>14</sup> Jorgen Hansen, "Returns to University Level Education: Variations Within Disciplines, Occupations and Employment Sectors", Human Resources and Social Development Canada, *Learning Research Series*, September, 2006.

**Table 8: Internal Rates of Return for a University Degree by Field of Study, 2001 (per cent)**

<b>Field of Study</b>	<b>Men (%)</b>	<b>Women (%)</b>
Educational, recreational and counselling services	3%	9%
Fine and applied arts	-7%	4%
Humanities and related fields	4%	9%
Social sciences and related fields	10%	10%
Business and commerce	13%	14%
Agricultural, biological, nutritional, and food sciences	6%	9%
Engineering	16%	13%
Health	10%	14%
Mathematics, computer and physical sciences	13%	14%
<b>Aggregate across all fields</b>	<b>11%</b>	<b>11%</b>

Source: Jorgen Hansen, 2006, p. 45-46.

These estimated rates of return suggest substantial variation in returns between women and men by field of study, despite the overall equality of returns to education between the genders. The higher rates of return experienced by men in engineering raise their overall average to the level of women, although women experience greater or equal returns in all other fields of study examined by Hansen.

Hansen also estimated the rates of return at three distinct points of time—1991, 1996 and 2001—and those results are shown in Table 9, on the following page.

**Table 9: Internal Rates of Return to University Education by Gender, 1991, 1996 and 2001 (per cent)**

	<b>1991</b> (%)	<b>1996</b> (%)	<b>2001</b> (%)	<b>Change from 1991 to 2001</b> (percentage point)
<b>Men</b>	9%	10%	11%	2 ppt.
<b>Women</b>	9%	10%	11%	2 ppt.

Source: Jorgen Hansen, 2006, p. 45-46.

These data suggest that the rates of return to university education rose for both men and women between 1991 and 2001. Hansen estimated the largest increases (3 percentage points) for men occurred in the engineering and health fields, while there were reduced returns (-8 percentage points) for men in fine and applied arts. For women, the largest increase in rates of return (3 percentage points) occurred in business and commerce, while they also had reductions in rates of return (-1 percentage point) in fine and applied arts, although less so than for men in the same area.

Hansen also estimated the rates of return to education by region within Canada, although the latest estimate of these data was for 1996. These estimates are shown in Table 10, below.

**Table 10: Internal Rates of Return to University Degree by Region, 1996 (per cent)**

	<b>Men</b> (%)	<b>Women</b> (%)
<b>Western Canada</b>	8%	9%
<b>Ontario</b>	11%	11%
<b>Quebec</b>	10%	11%
<b>Eastern Canada</b>	10%	10%

Source: Jorgen Hansen, 2006, p. 48-50.

Hansen's results suggest that the returns to university education are the lowest in Western Canada and the highest in Ontario and Quebec. The returns to men in Western Canada are the lowest in the country.

Hansen compared his results with four previous studies on returns to education in Canada and found, in all cases, that the trends over time he identified and disparities between genders and among disciplines were comparable to those identified in previous studies.<sup>15</sup> Hansen also noted that, while costs of education had risen over the 1990s, his analysis suggested that rates of return had increased because the incomes earned by university graduates had increased sufficiently to more than offset those cost increases, yielding increasing rates of return to university education.<sup>16</sup>

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<sup>15</sup> *Ibid.*, p. 51.

<sup>16</sup> *Ibid.*, p.55.

## Saskatchewan Evidence

A study conducted by Joy Vanstone at the University of Saskatchewan used 1996 Census data to estimate and compare private rates of return to education in Canada by ethnicity.<sup>17</sup> The approach used in the Vanstone study was the same as in the studies above, that is, calculating the “Mincer” Coefficients for various ethnic groups from all levels of education to reveal the impact on incomes of an additional year of education at any level. The simple Mincer Coefficients from the Vanstone study are shown in Table 11, below.

**Table 11: Contribution of Schooling to Income by Gender and Ethnicity, 1995 (per cent)**

	<b>Men (%)</b>	<b>Women (%)</b>
<b>Aboriginal Peoples</b>	12.1%	12.9%
<b>African-Canadians</b>	12.5%	13.2%
<b>Anglophone</b>	9.3%	12.2%
<b>Asian</b>	13.4%	16.6%
<b>Francophone</b>	10.0%	13.8%

Source: Joy Vanstone, 2004, p. 38.

Vanstone’s estimates would suggest that the highest returns to education in 1995 were found among Asian women, who experienced a 16.6 per cent increase in income for every year of education they acquired. The lowest return was among Anglophone men, whose annual incomes increased by an estimated 9.3 per cent for every additional year of schooling. In all cases, regardless of ethnicity, the returns to education were higher for women than for men with the greatest advantage being held by Francophone women, whose return to education was 3.8 percentage points above that for Francophone men. In every case, the impact of schooling on earnings was strongly positive and statistically significant.

The Vanstone study also provided estimates of returns after adjusting for location (urban versus rural) and for full-time versus part-time employment, noting that these variables may have a significant impact on earning potential. The results were significant in explaining the variation in incomes but left education coefficients that were still statistically significant, as seen in Table 12, on the following page.

<sup>17</sup> Joy Vanstone, “Returns to Education in Canada”, Master’s Research Project, Department of Economics, College of Graduate Studies and Research, University of Saskatchewan, 2004.

**Table 12: Contribution of Schooling to Income by Gender and Ethnicity Adjusted for Location and Hours of Work, 1995 (per cent)**

	<b>Men (%)</b>	<b>Women (%)</b>
<b>Aboriginal Peoples</b>	9.9%	10.6%
<b>African-Canadians</b>	10.9%	11.2%
<b>Anglophone</b>	8.2%	10.2%
<b>Asian</b>	10.1%	13.4%
<b>Francophone</b>	9.4%	12.2%

Source: Joy Vanstone, 2004, p. 42.

Adjusting for these other variables reduced the estimated impact of schooling for all groups but still left the returns to education at very high levels and left the relative impact by gender and ethnicity very much the same as in the simple estimates in Table 11. After adjusting for hours of work and location, Vanstone's estimates still showed returns to schooling to be higher for women than for men in all ethnic groups, with the lowest return being experienced by Anglophone men and the highest returns to schooling being experienced by Asian women.

Vanstone also adjusted the estimates of rates of return to focus the analysis on a sample limited to those aged between 19 and 54, on the basis that these people represented prime-age earners with the greatest attachment to the labour force, and therefore were most likely to demonstrate any effects schooling might have on labour force earnings. These narrower sample data were also adjusted for location (urban versus rural) and for job type (full-time versus part-time) and are illustrated in Table 13, below.

**Table 13: Contribution of Schooling to Income by Gender and Ethnicity for 19- to 54-year-olds Adjusted for Location and Hours of Work, 1995 (per cent)**

	<b>Men (%)</b>	<b>Women (%)</b>
<b>Aboriginal Peoples</b>	10.5%	12.8%
<b>African-Canadians</b>	11.4%	11.3%
<b>Anglophone</b>	8.4%	8.5%
<b>Asian</b>	10.1%	13.8%
<b>Francophone</b>	10.4%	12.8%

Source: Joy Vanstone, 2004, p. 45.

After these adjustments, women still retain their advantage in rates of return over men, although the advantage is very small for Anglophone women over Anglophone men, who retain the lowest rate of return of any of the sub-groups. The highest rate of return remains with Asian women, who experience a 13.8 per cent increase in income for every additional year of schooling they acquire.

Another study conducted by Prince Kofinti Owusu at the University of Saskatchewan focussed on estimating the specific public and private rates of return to education in Saskatchewan at different levels of education.<sup>18</sup> In this estimation, Owusu used 1996 Census data on incomes in 1995 and data on the cost of education collected from the Saskatchewan government and the Saskatoon School Division and used standard cost/benefit models to estimate both the public and private rates of return to males and females from various types of education. Further analysis also estimated the returns by field of study. Owusu's results, by level of education and gender, are shown in Table 14, below.

**Table 14: Private and Public Rates of Return to Education by Level and Gender, Saskatchewan, 1996**

	Public Returns		Private Returns	
	Male	Female	Male	Female
<b>Primary</b>	16.13%	11.09%	584.69%	447.07%
<b>Secondary</b>	10.58%	8.04%	20.54%	18.8%
<b>College</b>	8.5%	6.98%	19.22%	15.3%
<b>Bachelor</b>	11.14%	12.44%	16.59%	22.0%
<b>Master's</b>	6.14%	11.14%	10.43%	13.92%
<b>Ph. D.</b>	6.35%	14.31%	4.39%	20.56%

Source: Prince Owusu, 2000, p. 72.

As shown in Table 14, public rates of return tend to be less than private returns to education, with the sole exception of males with doctoral degrees. Public returns are estimated to be higher for males than for females up to the college level, while public returns are higher on education for females at all levels of university. The highest rate of public return was estimated for female doctoral graduates.

A similar pattern is observed for private rates of return, which were estimated to be higher for males up to the college level but higher for females at university levels.

<sup>18</sup> Prince Owusu, "Educational Returns: The Case of Saskatchewan", *Saskatchewan Economics Journal*, Volume 3, 2000, p. 53- 74.

Owusu also estimated the returns to education in Saskatchewan at the bachelor's level by fields of study; those results are shown in Table 15, below.

**Table 15: Private and Public Rates of Return to Education by Field of Study and Gender, Saskatchewan, 1996**

	Public Returns		Private Returns	
	Male	Female	Male	Female
<b>Agriculture</b>	8.81%	9.8%	11.73%	14.82%
<b>Commerce</b>	20.95%	17.52%	32.84%	29.82%
<b>Education</b>	6.69%	12.13%	8.8%	19.84%
<b>Engineering</b>	18.97%	11.17%	28.19%	19.86%
<b>Health Science</b>	10.41%	13.41%	15.12%	21.52%
<b>Humanities</b>	4.3%	11.26%	7.03%	18.93%
<b>Pure Science</b>	16.21%	10.03%	26.05%	17.2%
<b>Social Science</b>	12.23%	8.56%	18.42%	13.81%

Source: Prince Owusu, 2000, p. 72.

From Table 15 it can be seen that Owusu estimated the private rates of return to exceed the public rates of return for all fields of study at the bachelor's level. The greatest public rates of return were estimated for commerce graduates, at 18.97 per cent for males and 17.52 per cent for females. Private returns were higher for males than for females in commerce, engineering, pure science and social science and higher for females than for males in agriculture, education, health sciences and humanities.

Owusu notes that private returns to education generally exceed the level associated with investment of physical capital, estimated to be about 6.3 per cent, based on the performance of shares on the Toronto Stock Exchange.<sup>19</sup> They indicate that, in general, educational investment in Saskatchewan remains an acceptable choice for individuals. Based on Owusu's data, the one exception to this might be in the case of male doctoral candidates, who seem to have a much lower private rate of return than is the case for other levels of education.

<sup>19</sup> *Ibid.*, p. 59.

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## *A Caution on Conclusions*

The estimation of the rates of return on education has a well-established methodology in economic analysis, as is evidenced by the number of studies discussed above. Rates of return are generally estimated either as rates of return per dollar of “investment” on the part of either individuals (private) or the broader society (public or total rates of return) and are sometimes also shown as internal rates of return (IRR). Another approach is to illustrate returns to individuals in terms of expected additions to earning potential from another year of education. These data are shown as “Mincer Coefficients” in some studies discussed above.

Rates of return require the estimation of the costs of education, since they usually express their results in terms of “returns per dollar invested”. To estimate those costs requires certain assumptions about alternatives because, aside from the direct costs of education like tuition fees and books, for individuals, the largest costs are in the form of forgone income. Similarly, in estimating public rates of return, certain assumptions have to be made about the opportunity costs of education before one can calculate the rates of return.

While the Mincer Coefficients have the advantage of not requiring these assumptions, their results may be less useful in decision-making. A Mincer Coefficient can tell one what the expected income effect of another year of education may be but, in the absence of information about the cost of that additional year of education, one may still not be adequately informed. Mincer Coefficients do allow one to compare different levels of education or different fields of study, but one still needs to know the differences in costs to proceed on an informed basis. It is also true that Mincer Coefficients are limited to private returns to education and, therefore, have limited value in assessing the public policy implications of alternative education decisions.

More to the point, whether observing rates of return to education or Mincer Coefficients, all this analysis is based on cross-sectional data. In Canada, these data are usually drawn from Census data, which allow researchers to match earnings with levels of education and draw correlations. It should be remembered, however, that these data define a “snap shot” of the Canadian populace. They illustrate the earnings differentials between individuals who have completed their education program and are currently earning income. Trends identified by observing the situation of past graduates currently in the workforce may not hold for individuals currently in the education system. With the passage of time and changes in technology, the absolute and relative earnings of people with different skill sets will vary, sometimes quite dramatically.

In drawing any policy conclusions from these studies, one should be cautioned that the cost of education facing current students may not be the same as it was in the samples studied here, either in real or in nominal terms. The future incomes of current students also may not be the same as their forebears, either in real or nominal terms. Even if the observed ratios of income to cost for certain groups may have been stable over long periods of time in the past, one cannot assume they have not already been dramatically altered by changes in technology that will affect today’s students before they graduate, either positively or negatively. Thus, while these data may provide some useful indicators in discussing the value of education, either to individuals or to society at large, they must be examined thoughtfully in that discussion.

# Saskatchewan Institute of Public Policy

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