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Estimation of Research and Development Expenditures in the Higher Education Sector, 2002-2003

The higher education sector is composed of "all universities, colleges of technology and other institutes of post-secondary education, whatever their source of finance or legal status. It also includes all research institutes, experimental stations and clinics operating under the direct control of, or administered by, or associated with higher education establishments."¹

Highlights

- ▶ In 2002-2003, expenditures on research and development in the higher education sector (HERD) were estimated to total \$7.4 billion, an increase of 16% over 2001-2002 revised estimates. This increase is due to the fact that more teaching hospitals data are being included in the universities financial statistics provided to Statistics Canada. In 2002-2003, this reporting change is especially relevant in the provinces of Quebec and British Columbia.
- ▶ Of the total HERD, \$6 billion (81%) was spent in the natural sciences and engineering (including health sciences), and the remaining \$1.4 billion (19%) in the social sciences and humanities. Health science activities make up 49% (\$2.9 billion) of the total natural sciences and engineering R&D spending. Health science activities have increased by 23% over 2001-2002 estimates as a result of the improved reporting of hospitals data.
- ▶ The higher education sector funded itself a total of \$3.4 billion for R&D. External funding estimates for HERD in 2002-2003 show the federal government funding share being 24%, the provincial government funding 11% and business enterprise sector funding 9% of total HERD.
- ▶ There is a heavy concentration of R&D in the higher education sector in Quebec and Ontario (68%) because the largest number of institutions are located in the two provinces. All together, R&D activities of 75 universities are included in these statistics. Eastern Canada includes 16, Ontario and Quebec 44 and the Western provinces 15.

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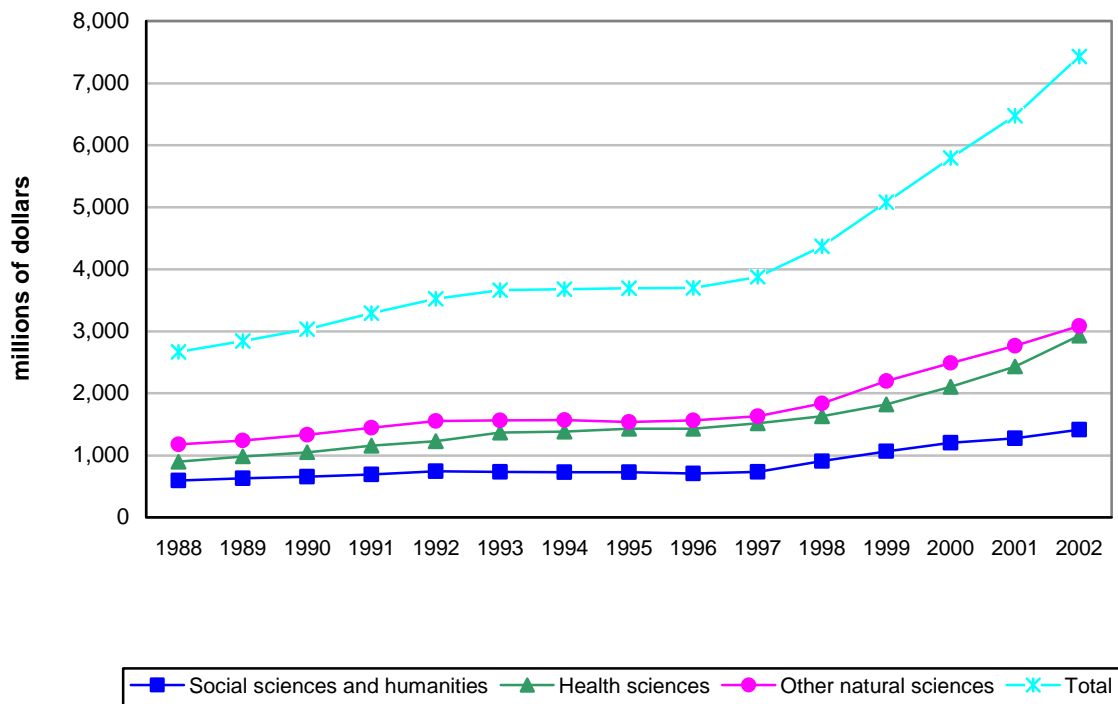
The higher education sector R&D performance figures are now estimated using a revised technique which was developed in 2000 and first applied to the 1998-99 data. It assumes that the total expenditures on HERD are equal to the sum of: a) sponsored research (available from CAUBO² sources), b) an estimate of indirect expenditures³ on sponsored research, c) a value for the fraction of faculty time devoted to sponsored and non-sponsored research, d) an estimate of indirect expenditures related to faculty time on research, and e) teaching hospitals data not included in CAUBO data.

The one-time grant to universities awarded by the federal government to assist in indirect costs associated with research activities taking place at the universities is included in the HERD (\$203 million in 2001-2002 and \$21 million in 2002-2003). The estimation system used to calculate indirect costs on sponsored research (item "b" above) was adjusted to ensure that the source of this one-time grant is the federal government.

Estimates of the faculty time spent on sponsored and non-sponsored research (item "c" above) for 1998-99 data forward are based upon a Faculty Time Use survey sponsored by the Natural Sciences & Engineering Research Council, Social Sciences & Humanities Research Council and the Canadian Institutes of Health Research.

More details of the HERD estimates can be found in the working paper titled "Estimation of Research and Development Expenditures in the Higher Education Sector, 2002-2003". This paper outlines the method used for calculating higher education R&D estimates.

HERD by major fields of science, 1988-89 to 2002-03



1. "The Measurement of Scientific and Technical Activities - Frascati Manual," OECD 2002.
2. Institutions in the higher education sector usually have records of funds received by them specifically for R&D, and some can provide lists of research projects carried out by staff. The R&D expenditure estimates are based on reports of payments awarded to institutions through the annual survey of the Canadian Association of University Business Officers (CAUBO).
3. A portion of the general operating budget attributed to sponsored research (e.g. library, computing, administration, physical plant, and student services).

Table 1. Estimates of R&D expenditures in the higher education sector, by source of funds and by major fields of science, 2002-03

Sources of funds	Social sciences and humanities ¹	Health sciences ²	Other natural sciences and engineering ³	Total
millions of dollars				
Federal government	228.5	752.2	836.0	1,816.7
Provincial governments	165.7	248.6	414.3	828.6
Business enterprise	23.7	260.5	358.9	643.1
Higher education	885.1	1,256.5	1,293.8	3,435.4
Private non-profit organizations	111.1	371.1	122.3	604.5
Foreign	0.0	40.2	60.3	100.5
Total	1,414.1	2,929.1	3,085.6	7,428.8

1. *Social sciences embrace all disciplines involving the study of human actions and conditions and the social, economic and institutional mechanisms affecting humans. Included are such disciplines as anthropology, business administration and commerce, communications, criminology, demography, economics, geography, history, languages, literature and linguistics, law, library science, philosophy, political sciences, psychology, religious studies, social work, sociology, and urban and regional studies.*

2. *Health sciences consist of programmes directed towards the protection and improvement of human health.*

3. *Other natural sciences consist of disciplines, other than health sciences, concerned with understanding, exploring, developing or utilizing the natural world. Included are the engineering, mathematical and physical sciences.*

Table 2. Estimates of R&D expenditures in the higher education sector, by source of funds, 1988-89 to 2002-03

Year	Federal government	Provincial government	Business enterprise	Higher education	Private non-profit organizations	Foreign	Total
millions of dollars							
1988-89	624.9	261.2	115.1	1,481.5	172.8	13.2	2,668.7
1989-90	669.4	285.5	139.7	1,571.9	165.2	11.8	2,843.5
1990-91	782.9	282.7	151.1	1,618.4	185.8	12.1	3,033.0
1991-92	813.3	288.9	229.2	1,731.6	215.2	11.0	3,289.2
1992-93	848.7	294.2	293.1	1,867.2	196.2	20.1	3,519.5
1993-94	872.7	312.4	313.9	1,892.1	248.3	20.3	3,659.7
1994-95	869.8	314.7	296.1	1,913.8	259.2	21.3	3,674.9
1995-96	854.8	323.2	296.7	1,926.6	265.7	24.2	3,691.2
1996-97	809.0	297.6	335.6	1,905.5	312.7	36.4	3,696.8
1997-98	792.7	369.9	381.0	1,971.5	324.5	39.5	3,879.1
1998-99	862.9	371.6	411.0	2,339.4	335.1	49.5	4,369.5
1999-00	1,084.6	482.2	460.3	2,648.8	349.2	56.6	5,081.7
2000-01 ^r	1,292.8	587.2	553.4	2,892.1	418.2	49.6	5,793.3
2001-02 ^r	1,586.8	712.0	603.3	2,928.9	509.1	84.1	6,424.2
2002-03	1,816.7	828.6	643.1	3,435.4	604.5	100.5	7,428.8

Table 3. Estimates of R&D expenditures in the higher education sector, by source of funds and by province, 2002-03							
Province	Federal government	Provincial government	Business enterprise	Higher education	Private non-profit organizations	Foreign	Total
millions of dollars							
Newfoundland and Labrador	28.8	1.3	10.0	52.5	1.7	0.0	94.3
Prince Edward Island	4.2	0.4	0.5	12.6	1.0	0.0	18.7
Nova Scotia	52.0	6.9	20.9	125.8	17.5	1.5	224.6
New Brunswick	20.3	2.3	2.7	67.0	6.0	0.6	98.9
Quebec	528.7	261.8	175.3	1,004.1	170.8	26.2	2,166.9
Ontario	685.0	307.7	295.2	1,298.3	239.4	52.1	2,877.7
Manitoba	55.7	15.8	17.9	108.4	24.5	2.3	224.6
Saskatchewan	56.6	35.6	15.9	129.4	21.5	0.1	259.1
Alberta	180.7	121.7	44.5	320.9	52.1	6.9	726.8
British Columbia	204.7	75.1	60.2	316.4	70.0	10.8	737.2
Canada	1,816.7	828.6	643.1	3,435.4	604.5	100.5	7,428.8

Table 4. Estimates of R&D expenditures in the higher education sector, by province, 1988-89 to 2002-03											
Year	Province										Canada
	N.L.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	
millions of dollars											
1988-89	50.9	3.9	116.8	41.3	707.6	1,044.3	110.7	84.9	264.3	244.0	2,668.7
1989-90	52.8	4.0	117.3	43.4	788.4	1,108.2	110.8	89.0	270.6	259.0	2,843.5
1990-91	54.8	4.1	117.9	45.7	878.5	1,176.1	110.8	93.2	277.0	274.9	3,033.0
1991-92	57.5	5.1	127.5	49.7	1,030.7	1,211.2	113.8	100.7	290.4	302.6	3,289.2
1992-93	60.5	4.8	121.2	53.2	1,150.4	1,280.1	116.8	103.3	294.7	334.5	3,519.5
1993-94	60.9	4.4	119.0	52.5	1,163.0	1,422.6	110.7	106.2	296.8	323.6	3,659.7
1994-95	58.5	3.8	113.2	53.8	1,136.1	1,441.3	114.8	108.2	309.0	336.2	3,674.9
1995-96	58.4	3.7	117.0	56.2	1,111.5	1,432.7	113.5	113.9	327.8	356.5	3,691.2
1996-97	56.6	4.2	117.6	56.3	1,099.3	1,456.1	111.3	113.6	328.8	353.0	3,696.8
1997-98	61.2	5.9	125.0	57.4	1,131.6	1,554.2	108.3	118.9	357.7	358.9	3,879.1
1998-99	72.0	11.4	164.1	80.4	1,273.8	1,699.7	130.8	138.4	408.1	390.8	4,369.5
1999-00	78.6	11.4	199.6	89.0	1,532.9	1,908.0	157.6	176.1	490.9	437.6	5,081.7
2000-01 ^f	83.4	15.7	199.9	88.2	1,628.6	2,316.2	189.6	228.2	546.0	497.5	5,793.3
2001-02 ^f	89.4	15.7	208.6	88.2	1,778.5	2,575.9	205.9	235.6	664.9	561.5	6,424.2
2002-03	94.3	18.7	224.6	98.9	2,166.9	2,877.7	224.6	259.1	726.8	737.2	7,428.8

Table 5. Estimates of R&D expenditures in the higher education sector, on social sciences and humanities, by province, 1988-89 to 2002-03

Province											
Year	N.L.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada
millions of dollars											
1988-89	13.7	1.0	24.8	11.7	158.7	227.5	23.8	17.8	58.1	56.6	593.7
1989-90	15.8	1.0	24.6	12.4	173.8	239.7	23.8	19.0	56.1	59.8	626.0
1990-91	15.9	1.1	23.8	13.0	188.6	256.4	23.6	19.0	56.9	56.1	654.4
1991-92	17.2	1.4	26.1	13.2	198.5	265.4	24.8	20.7	59.8	60.3	687.9
1992-93	15.9	1.3	27.6	13.2	211.3	287.5	25.5	21.2	60.3	74.8	738.6
1993-94	15.6	1.1	25.1	14.2	216.6	282.6	23.8	21.1	61.3	69.1	730.5
1994-95	15.6	0.9	23.5	13.9	217.5	278.9	24.2	21.9	58.7	70.4	725.5
1995-96	15.4	0.9	23.0	13.8	213.5	269.1	24.7	23.8	64.5	76.0	724.7
1996-97	15.2	1.1	21.3	13.2	204.9	259.6	24.5	23.9	61.1	80.4	705.2
1997-98	14.7	1.5	21.9	12.8	203.6	285.6	23.8	26.9	62.2	78.7	731.7
1998-99	16.5	3.5	40.9	25.4	243.9	341.9	33.6	32.6	71.6	93.9	903.8
1999-00	20.5	3.7	48.1	27.8	296.4	401.0	40.4	36.8	86.2	101.6	1,062.5
2000-01	19.2	4.5	51.9	29.8	323.6	473.5	43.1	47.6	95.5	113.7	1,202.4
2001-02	23.8	4.3	48.9	29.7	331.4	515.0	44.7	48.5	107.3	120.9	1,274.5
2002-03	21.7	5.6	51.2	32.2	396.3	535.1	48.7	51.6	120.7	151.0	1,414.1

Table 6. Estimates of R&D expenditures in the higher education sector, on health sciences, by province, 1988-89 to 2002-03

Province											
Year	N.L.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada
millions of dollars											
1988-89	12.8	0.4	35.6	2.0	248.3	367.0	44.2	22.4	93.8	68.6	895.1
1989-90	12.5	0.5	36.7	3.1	279.3	403.2	44.0	24.7	103.2	72.9	980.1
1990-91	12.9	0.6	32.9	3.4	324.8	417.1	44.3	25.1	103.9	84.3	1,049.3
1991-92	14.6	0.7	36.6	3.3	401.5	429.1	44.2	26.9	110.7	88.8	1,156.4
1992-93	13.8	0.5	34.7	3.1	443.6	448.6	46.4	27.3	115.7	95.3	1,229.0
1993-94	15.3	0.5	39.1	3.6	460.4	561.8	44.2	28.0	120.0	94.0	1,366.9
1994-95	15.6	0.3	38.8	3.6	458.6	571.4	44.9	27.8	123.7	97.4	1,382.1
1995-96	15.3	0.3	45.7	4.7	452.5	606.1	43.8	30.4	126.8	102.8	1,428.4
1996-97	15.0	0.3	46.3	4.6	449.0	614.1	42.7	27.3	130.0	101.1	1,430.4
1997-98	17.3	0.6	52.8	4.8	457.4	661.6	40.8	31.1	147.3	102.4	1,516.1
1998-99	21.6	0.6	62.2	6.8	507.8	671.1	45.6	36.1	166.5	109.5	1,627.8
1999-00	20.1	0.6	71.8	7.1	597.5	706.1	53.8	43.5	199.5	122.5	1,822.5
2000-01 ^f	23.9	1.4	72.6	7.5	633.9	875.6	62.0	57.9	225.0	144.1	2,103.9
2001-02 ^f	25.4	1.3	83.4	7.7	700.2	977.1	74.1	67.6	274.5	171.3	2,382.6
2002-03	29.6	2.2	87.2	9.2	906.1	1,178.8	81.3	76.6	305.3	252.8	2,929.1

Table 7. Estimates of R&D expenditures in the higher education sector, on health sciences and other natural sciences and engineering, by province, 1988-89 to 2002-03

Year	Province										Canada
	N.L.	P.E.I.	N.B.	N.S.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	
	millions of dollars										
1988-89	37.2	2.9	92.0	29.6	548.9	816.8	86.9	67.1	206.2	187.4	2,075.0
1989-90	37.0	3.0	92.8	31.1	614.6	868.6	86.9	69.9	214.5	199.1	2,217.5
1990-91	38.8	3.1	94.1	32.7	689.9	919.6	87.2	74.2	220.2	218.8	2,378.6
1991-92	40.4	3.7	101.3	36.5	832.2	945.8	89.0	80.0	230.7	241.7	2,601.3
1992-93	44.6	3.6	93.6	39.9	939.0	992.6	91.3	82.2	234.4	259.7	2,780.9
1993-94	45.3	3.3	93.9	38.3	946.4	1,140.0	86.9	85.1	235.5	254.5	2,929.2
1994-95	42.9	3.0	89.7	39.8	918.6	1,162.5	90.5	86.3	250.3	265.7	2,949.3
1995-96	43.0	2.8	94.0	42.3	898.0	1,163.7	88.8	90.1	263.3	280.5	2,966.5
1996-97	41.4	3.1	96.3	43.0	894.4	1,196.6	86.8	89.7	367.7	272.6	2,991.6
1997-98	46.5	4.3	103.1	44.5	928.1	1,268.6	84.5	92.1	295.5	280.2	3,147.4
1998-99	55.5	7.9	123.2	55.0	1,029.8	1,357.8	97.2	105.9	336.5	296.9	3,465.7
1999-00	58.1	7.8	151.4	61.3	1,236.5	1,507.0	117.2	139.3	404.6	336.1	4,019.3
2000-01 ^f	64.1	11.2	148.1	58.4	1,305.1	1,842.7	146.5	180.6	450.5	383.7	4,590.9
2001-02 ^f	65.6	11.4	159.6	58.5	1,446.9	2,060.9	161.1	187.1	557.7	440.9	5,149.7
2002-03	72.6	13.1	173.4	66.7	1,770.6	2,342.6	175.9	207.5	606.1	586.2	6,014.7

Symbols

The following standard symbols are used in Statistics Canada publications:

- . not available for any reference period
- .. not available for a specific reference period
- ... not applicable
- 0 true zero or a value rounded to zero
- 0^s value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
- ^p preliminary
- ^r revised
- x suppressed to meet the confidentiality requirements of the *Statistics Act*
- ^E use with caution
- F too unreliable to be published

Note

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Industrial research and development, 2004 intentions, (with 2003 preliminary estimates and 2002 actual expenditures), to be released in December of 2004 catalogue no. 88-202-XIE, annual. It presents statistics on research and development (R&D) activities performed and funded by Canadian business enterprises. The report covers current and capital expenditures on R&D, R&D as a percent of performing company revenues, R&D expenditures by province, the company's country of control, personnel engaged in R&D and payments for technological services.

<http://www.statcan.ca/english/IPS/Data/88-202XIE.htm>

Federal science activities, 2003-2004, catalogue no. 88-204-XIE, annual. It presents statistics on the federal government's activities in science and technology (S&T). It covers expenditures and person-years by type of science, performing sectors, provinces, federal departments and agencies.

<http://www.statcan.ca/english/IPS/Data/88-204XIE.htm>

Note of appreciation

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