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Estimation of research and development expenditures in the higher education sector, 2003-04

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 2003-04, expenditures on research and development in the higher education sector (HERD) amounted to \$8.1 billion, an increase of 9% over 2002-03 revised estimates. This increase is explained by augmented funding from two sources: the grants and contract part of funding provided to the higher education sector by provincial government (23%) and, increased funding from federal government (20%). Two domains, social sciences and humanities (+13%) and natural sciences and engineering (+12%) benefited from the increased funding. Health related research increased by 4%.
- ▶ Of the total HERD, \$6.5 billion (80%) was spent in the natural sciences and engineering (including health sciences), and the remaining \$1.6 billion (20%) in the social sciences and humanities. Health science activities make up 38% (\$3.1 billion) of the total higher education R&D spending.
- ▶ The higher education sector funded 44% of the R&D performed in this sector for a total \$3.6 billion. External funding estimates for HERD in 2003-04 show the federal government funding share being 27%, the provincial government funding 12%, business enterprise sector funding 8% and private non-profit organizations funding 7% of total HERD.
- ▶ There is a heavy concentration of R&D expenditures 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 74 universities are included in these statistics. Eastern Canada includes 16, Ontario and Quebec 43 and the Western provinces 15.

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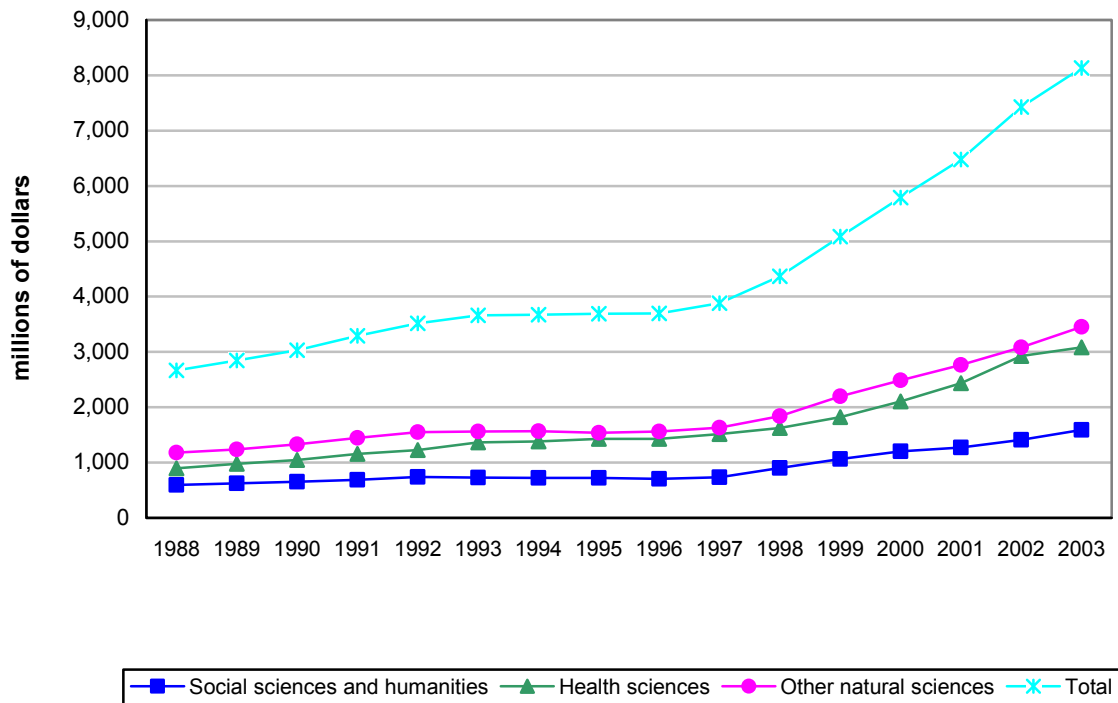
The higher education sector R&D performance figures are now estimated using a revised technique which was developed in 2000 and first applied to the 1998-99 data. It assumes that the total expenditures on HERD are equal to the sum of: a) sponsored research, available from the Canadian Association of University Business Officers (CAUBO) sources, b) an estimate of indirect expenditures² 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 2001-02 and \$21 million in 2002-03). In 2003-04, the indirect costs grant for R&D in universities became an annual payment. The estimation system used to calculate indirect costs on sponsored research (item "b" above) was adjusted to ensure that the source of this payment 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 (NSERC), Social Sciences & Humanities Research Council (SSHRC) and the Canadian Institutes of Health Research (CIHR).

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, 2003-04". This paper outlines the method used for calculating higher education R&D estimates.

HERD by major fields of science, 1988-89 to 2003-04



1. "The Measurement of Scientific and Technical Activities - Frascati Manual," Paris OECD 2002.
 2. A portion of the general operating budget attributed to sponsored research (e.g. library, computing, administration, physical plant, and student services).

Sources of funds	Social sciences and humanities ¹	Health sciences ²	Other natural sciences and engineering ³	Total
millions of dollars				
Federal government	336.2	813.7	1,031.8	2,181.7
Provincial governments	203.7	305.4	509.0	1,018.1
Business enterprise	24.9	267.3	386.9	679.1
Higher education	914.5	1,299.8	1,363.4	3,577.7
Private non-profit organizations	114.1	369.1	116.2	599.4
Foreign	0.0	30.3	45.5	75.8
Total	1,593.4	3,085.6	3,452.8	8,131.8

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 engineering, mathematical and physical sciences.*

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	1,292.8	587.2	553.4	2,892.1	418.2	49.6	5,793.3
2001-02	1,586.8	712.0	603.3	2,928.9	509.1	84.1	6,424.2
2002-03 ^f	1,816.7	828.6	643.2	3,461.8	604.5	100.5	7,455.3
2003-04	2,181.7	1,018.1	679.1	3,577.7	599.4	75.8	8,131.8

Table 3 Estimates of R&D expenditures in the higher education sector, by source of funds and by province, 2003-04							
Province	Federal government	Provincial government	Business enterprise	Higher education	Private non-profit organizations	Foreign	Total
millions of dollars							
Newfoundland and Labrador	35.2	0.8	9.7	63.9	4.5	0.0	114.1
Prince Edward Island	6.6	0.6	0.3	14.5	1.5	0.0	23.5
Nova Scotia	60.0	6.8	21.5	146.3	23.5	1.0	259.1
New Brunswick	30.1	3.8	4.1	67.8	7.2	0.0	113.0
Quebec	645.5	333.6	186.9	994.4	165.5	15.4	2,341.3
Ontario	826.2	357.0	294.1	1,420.2	243.4	43.5	3,184.4
Manitoba	62.4	15.8	19.4	114.5	24.8	1.8	238.7
Saskatchewan	63.8	29.8	17.7	121.1	11.7	0.7	244.8
Alberta	220.7	182.5	59.9	313.5	44.2	6.0	826.8
British Columbia	231.2	87.4	65.5	321.5	73.1	7.4	786.1
Canada	2,181.7	1,018.1	679.1	3,577.7	599.4	75.8	8,131.8

Table 4 Estimates of R&D expenditures in the higher education sector, by province, 1988-89 to 2003-04											
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	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	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 ^r	94.4	18.7	225.5	98.9	2,074.3	2,995.5	224.5	258.8	727.5	737.2	7,455.3
2003-04	114.1	23.5	259.1	113.0	2,341.3	3,184.4	238.7	244.8	826.8	786.1	8,131.8

Table 5 Estimates of R&D expenditures in the higher education sector, on social sciences and humanities, by province, 1988-89 to 2003-04											
Year	Province										Canada
	N.L.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	
	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 ^f	21.7	5.6	51.3	32.2	396.3	535.1	48.7	51.5	120.7	151.0	1,414.1
2003-04	29.2	6.4	58.0	36.4	451.5	601.3	54.1	48.0	143.2	165.3	1,593.4

Table 6 Estimates of R&D expenditures in the higher education sector, on health sciences, by province, 1988-89 to 2003-04											
Year	Province										Canada
	N.L.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	
	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	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	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 ^f	29.7	2.1	88.1	9.2	813.5	1,296.6	81.2	76.4	306.1	252.7	2,955.6
2003-04	36.0	3.4	107.3	10.1	876.1	1,314.6	83.1	65.3	330.0	259.7	3,085.6

Table 7 Estimates of R&D expenditures in the higher education sector, on natural sciences and engineering, by province, 1988-89 to 2003-04

Year	Province										Canada
	N.L.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta	B.C.	
	millions of dollars										
1988-89	24.4	2.5	56.4	27.6	300.6	449.8	42.7	44.7	112.4	118.8	1,179.9
1989-90	24.5	2.5	56.1	28.0	335.3	465.4	42.9	45.2	111.3	126.2	1,237.4
1990-91	25.9	2.5	61.2	29.3	365.1	502.5	42.9	49.1	116.3	134.5	1,329.3
1991-92	25.8	3.0	64.7	33.2	430.7	516.7	44.8	53.1	120.0	152.9	1,444.9
1992-93	30.8	3.1	58.9	36.8	495.4	544.0	44.9	54.9	118.7	164.4	1,551.9
1993-94	30.0	2.8	54.8	34.7	486.0	578.2	42.7	57.1	115.5	160.5	1,562.3
1994-95	27.3	2.7	50.9	36.2	460.0	591.1	45.6	58.5	126.6	168.3	1,567.2
1995-96	27.7	2.5	48.3	37.6	445.5	557.6	45.0	59.7	136.5	177.7	1,538.1
1996-97	26.4	2.8	50.0	38.4	445.4	582.5	44.1	62.4	137.7	171.5	1,561.2
1997-98	29.2	3.7	50.3	39.7	470.7	607.0	43.7	61.0	148.2	177.8	1,631.4
1998-99	33.9	7.3	61.0	48.2	522.0	686.7	51.6	69.8	170.0	187.4	1,837.9
1999-00	38.0	7.2	79.6	54.2	639.0	800.9	63.4	95.8	205.1	213.6	2,196.8
2000-01	40.2	9.8	75.5	50.9	671.2	967.1	84.5	122.7	225.5	239.6	2,487.0
2001-02	40.2	10.1	76.2	50.8	746.7	1,083.8	87.0	119.5	283.2	269.6	2,767.1
2002-03 ^f	43.0	11.0	86.1	57.5	864.5	1,163.8	94.6	130.9	300.7	333.5	3,085.6
2003-04	48.9	13.7	93.8	66.5	1,013.7	1,268.5	101.5	131.5	353.6	361.1	3,452.8

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

This publication was prepared by **Gisèle Bellefeuille** under the direction of **Janet Thompson**, Unit Head, Science and Innovation Surveys section, Science, Innovation and Electronic Information Division.

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Federal Science Activities, 2004-2005 estimates, 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.

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