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Estimation of research and development expenditures in the higher education sector, 2001-2002

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]

The higher education sector is one of the sectors that make up the national research and development (R&D) system. For most policy analysis, the R&D system is sub-divided into five performing sectors: the federal government, provincial governments, business enterprise, higher education, and private non-profit. It is also sub-divided into six funding sectors: the five above plus all foreign sources.

Highlights

- In 2001-2002, expenditures on research and development in the higher education sector (HERD) were estimated to total $6.5 billion, an increase of 12 % over 2000-2001 revised estimates. The federal government contributed to 43% of the increase through a one-time grant awarded to universities for indirect costs related to sponsored research. Another 18% of the increase is attributed to the provincial governments who funded an additionnal $125 million to universities for R&D in 2001-2002.

- Of the total HERD, $5.2 billion (80%) was spent in the natural sciences and engineering (including health sciences), and the remaining $1.3 billion (20%) in the social sciences and humanities. Health science activities make up 47% ($2.4 billion) of the total natural sciences and engineering R&D spending.

- Funding attributed to the higher education sector itself totals $3.0 billion dollars. External funding estimates for HERD in 2001-2002 show the federal government funding share being 25%, the provincial government funding 11% and business enterprise sector funding 9% of total HERD.

- There are 16 universities in eastern Canada who performed sponsored research in 2001-2002, 15 universities in the western provinces and 45 universities in the provinces of Ontario and Quebec. This reflects the heavy concentration (68 %) of R&D activities in the higher education sector being performed by universities in Ontario and Quebec.

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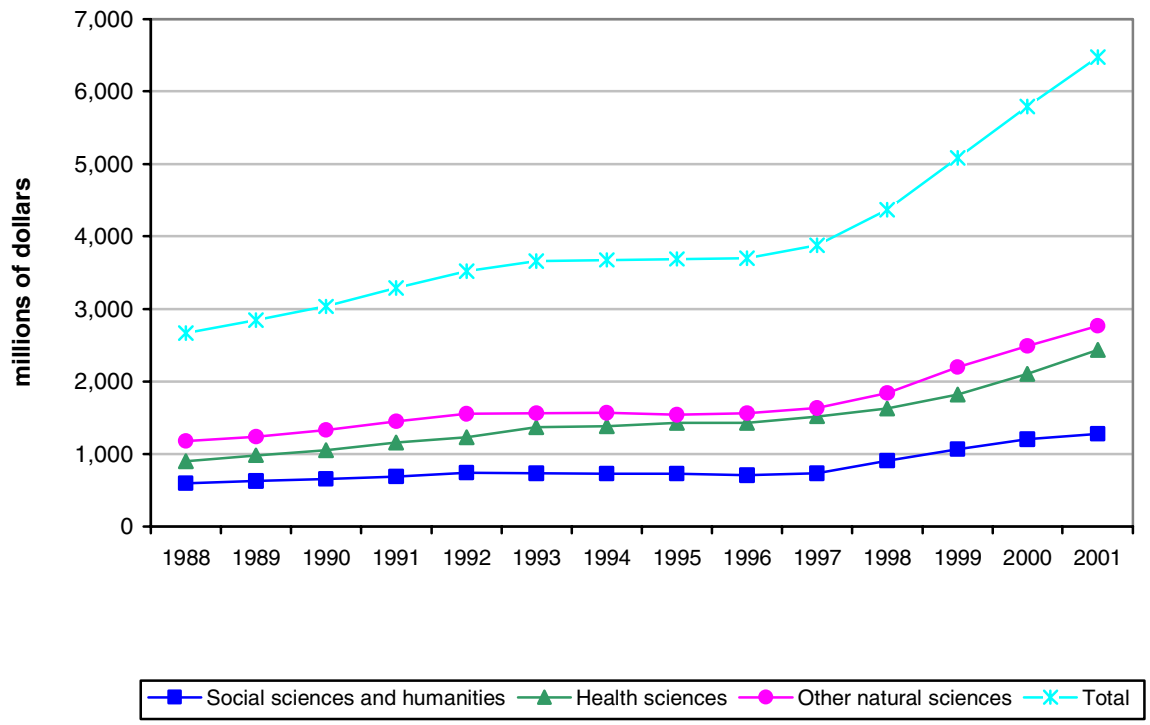
The higher education sector R&D performance figures are estimated using a new technique which was developed in 2000 and first applied to the 1998-99 data. It assumes that the total expenditures on HERD are equal to the sum of: a) sponsored research (available from CAUBO[2] sources), b) an estimate of indirect expenditures[3] 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.

In 2001-2002 the federal government awarded a one-time grant to universities to assist in indirect costs associated with research activities taking place at the universities. The estimation system used to calculate indirect costs on sponsored research (item "b" above) has been 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, 2001-2002". This paper outlines the method used for calculating higher education R&D estimates.

HERD by major fields of science, 1988-89 to 2001-2002



[1] *"The Measurement of Scientific and Technical Activities - Frascati Manual," OECD 1993.*

[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, 2001-2002

Source of funds	Social sciences and humanities[1]	Health sciences[2]	Other natural sciences and engineering[3]	Total
	millions of dollars			
Federal government	231.2	564.1	791.5	1,586.8
Provincial governments	142.4	213.6	356.0	712.0
Business enterprise	25.3	235.7	342.3	603.3
Higher education	778.1	1,074.6	1,127.3	2,980.0
Private non-profit organizations	97.5	312.1	99.5	509.1
Foreign	0.0	33.6	50.5	84.1
Total	**1,274.5**	**2,433.7**	**2,767.1**	**6,475.3**

[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 2001-2002

Year	Federal government	Provincial governments	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
1999-2000	1,084.6	482.2	460.3	2,648.8	349.2	56.6	5,081.7
2000-2001[r]	1,292.8	587.2	553.4	2,890.9	418.2	49.6	5,792.1
2001-2002	1,586.8	712.0	603.3	2,980.0	509.1	84.1	6,475.3

TABLE 3. Estimates of R&D expenditures in the higher education sector, by source of funds and by province, 2001-2002

Province	Federal government	Provincial governments	Business enterprise	Higher education	Private non-profit organizations	Foreign	Total
	millions of dollars						
Newfoundland and Labrador	21.4	3.4	3.5	54.5	3.8	2.8	89.4
Prince Edward Island	2.7	0.7	1.2	10.5	0.6	0.0	15.7
Nova Scotia	49.0	5.2	19.5	118.7	15.2	1.0	208.6
New Brunswick	15.9	1.8	3.5	59.0	7.6	0.4	88.2
Quebec	448.0	192.9	175.7	837.0	146.1	19.8	1,819.5
Ontario	611.0	291.3	267.0	1,164.2	213.3	42.4	2,589.2
Manitoba	44.5	14.7	18.6	103.9	21.4	2.7	205.8
Saskatchewan	56.7	42.3	11.1	111.7	13.6	0.2	235.6
Alberta	176.2	125.3	52.4	258.8	46.1	6.1	664.9
British Columbia	161.4	34.4	50.9	261.7	41.4	8.6	558.4
Canada	**1,586.8**	**712.0**	**603.4**	**2,980.0**	**509.1**	**84.0**	**6,475.3**

TABLE 4. Estimates of R&D expenditures in the higher education sector, by province, 1988-89 to 2001-2002

Year	Province										
	N.L.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada
	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
1999-2000	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
2000-2001[r]	83.4	15.7	199.9	88.2	1,628.6	2,316.2	189.6	228.2	546.0	496.3	5,792.1
2001-2002	89.4	15.7	208.6	88.2	1,819.5	2,589.2	205.8	235.6	664.9	558.4	6,475.3

TABLE 5. Estimates of R&D expenditures in the higher education sector, on social sciences and humanities, by province, 1988-89 to 2001-2002

Year	Province										
	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	60.8	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
1999-2000	20.5	3.7	48.1	27.8	296.4	401.0	40.4	36.8	86.2	101.6	1,062.5
2000-2001[r]	19.2	4.5	51.9	29.8	323.6	473.5	43.1	47.6	95.5	113.7	1,202.4
2001-2002	23.8	4.3	48.9	29.7	331.4	515.0	44.7	48.5	107.3	120.9	1,274.5

TABLE 6. Estimates of R&D expenditures in the higher education sector, on health sciences, by province, 1988-89 to 2001-2002

Year	Province										
	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
1999-2000	20.1	0.6	71.8	7.1	597.5	706.1	53.8	43.5	199.5	122.5	1,822.5
2000-2001[r]	23.9	1.4	72.6	7.5	633.9	875.6	62.0	57.9	225.0	142.9	2,102.7
2001-2002	25.4	1.3	83.4	7.7	741.4	990.4	73.9	67.6	274.5	168.1	2,433.7

TABLE 7. Estimates of R&D expenditures in the higher education sector, on natural sciences and engineering[1], by province,1988-89 to 2001-2002

Year	Province										Canada
	N.L.	P.E.I.	N.S.	N.B.	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	267.7	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
1999-2000	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
2000-2001[r]	64.1	11.2	148.1	58.4	1,305.1	1,842.7	146.5	180.6	450.5	382.5	4,589.7
2001-2002	65.6	11.4	159.6	58.5	1,488.1	2,074.2	161.1	187.1	557.7	437.5	5,200.8

[1] *Includes "health" and "other natural sciences and engineering".*

Symbols

.. figures not available
... figures not appropriate or not applicable
[r] revised figures

This publication was prepared by **Janet Thompson** under the direction of **Antoine Rose**, Science, Innovation and Electronic Information Division.

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