Industry, Science and Technology Canada
Industrie, Sciences et Technologie Canada

SELECTED SCIENCE AND TECHNOLOGY STATISTICS

1990

Canada

SELECTED SCIENCE AND TECHNOLOGY STATISTICS

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Introduction

Science and Technology (S&T) is defined by UNESCO as *systematic activities which are closely concerned with the generation, dissemination and application of scientific and technical knowledge in all fields of science and technology.*

Canada uses the definition of research and development (R&D) found in the *Frascati Manual*, published by the Organisation for Economic Co-operation and Development (OECD). It is *creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.*

Related scientific activities (RSA) refers to those activities that complement or extend R&D by contributing to the generation, dissemination and application of S&T knowledge, such as routine data gathering and services provided by technical libraries.

In order to make use of statistics, analysts often put them into context by comparing the measured quantity with some other variable, such as time or geographic location. For practical purposes, it is usually necessary to modify S&T statistics to take into account the wide variation in size of national or provincial economies, populations, etc. Thus, S&T indicators are usually expressed as a ratio of two statistics: the numerator is the specialized statistic, such as R&D spending, and the denominator is a general statistic, such as GDP or population.

Abbreviations

BE – business enterprise
CCPC – Canadian-controlled private corporation
GDP – gross domestic product
GERD – gross domestic expenditure on research and development
ISTC – Industry, Science and Technology Canada
NA – not applicable
NCR – National Capital Region
PNP – private non-profit organization
PRO – provincial research organization
R&D – research and development
RSA – related scientific activities
S&T – science and technology

A publication of this type is a snapshot, freezing information at a particular point in time. New data are constantly becoming available.

As with any compendium of numbers, errors inevitably creep into the tables. Readers are encouraged to make the S&T Economic Analysis Division aware of any inconsistencies or errors.

National GERD

	1983	1984	1985	1986	1987	1988	1989	1990
				($ millions)				
Actual $	5 348	6 015	6 709	7 220	7 542	8 058	8 568	9 097
1981 $	4 687	5 110	5 558	5 841	5 847	6 000	6 085	6 231*
				(percent)				
Real growth	1.2	9.0	8.8	5.1	0.1	2.6	1.4	2.4 *
GERD/GDP	1.32	1.35	1.40	1.43	1.37	1.33	1.32	1.34*

* *ISTC estimate.*
Source: Statistics Canada.

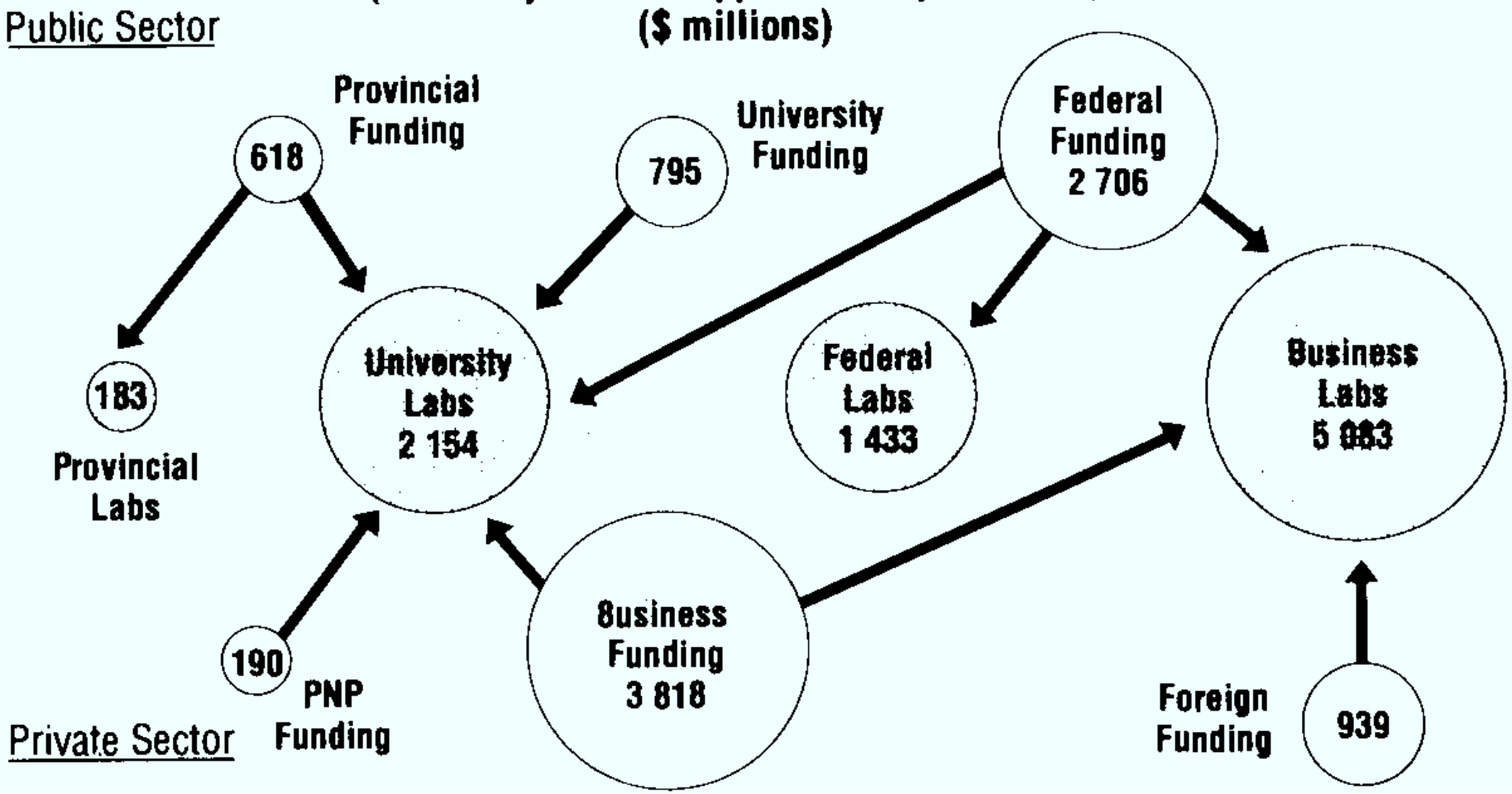
Expenditures on R&D by Funding and Performing Sectors, 1990

Funder	Federal	Provincial	PRO	BE	University	PNP	Total	Percent
				($ millions)				
Federal	1 433	–	8	506	715	44	2 706	30
Provincial	–	183	49	61	299	26	618	7
PRO	–	–	3	–	–	–	3	0
BE	–	–	25	3 577	201	15	3 818	42
University	–	–	–	–	795	–	795	9
PNP	–	–	–	–	129	61	190	2
Foreign	–	–	3	939	15	10	967	11
Total	1 433	183	88	5 083	2 154	156	9 097	100
Percent	16	2	1	56	24	2	100	

Source: Statistics Canada.

R&D Spending Flows, 1990

(Size of symbols is approximately to scale.)
($ millions)



Source: Statistics Canada.

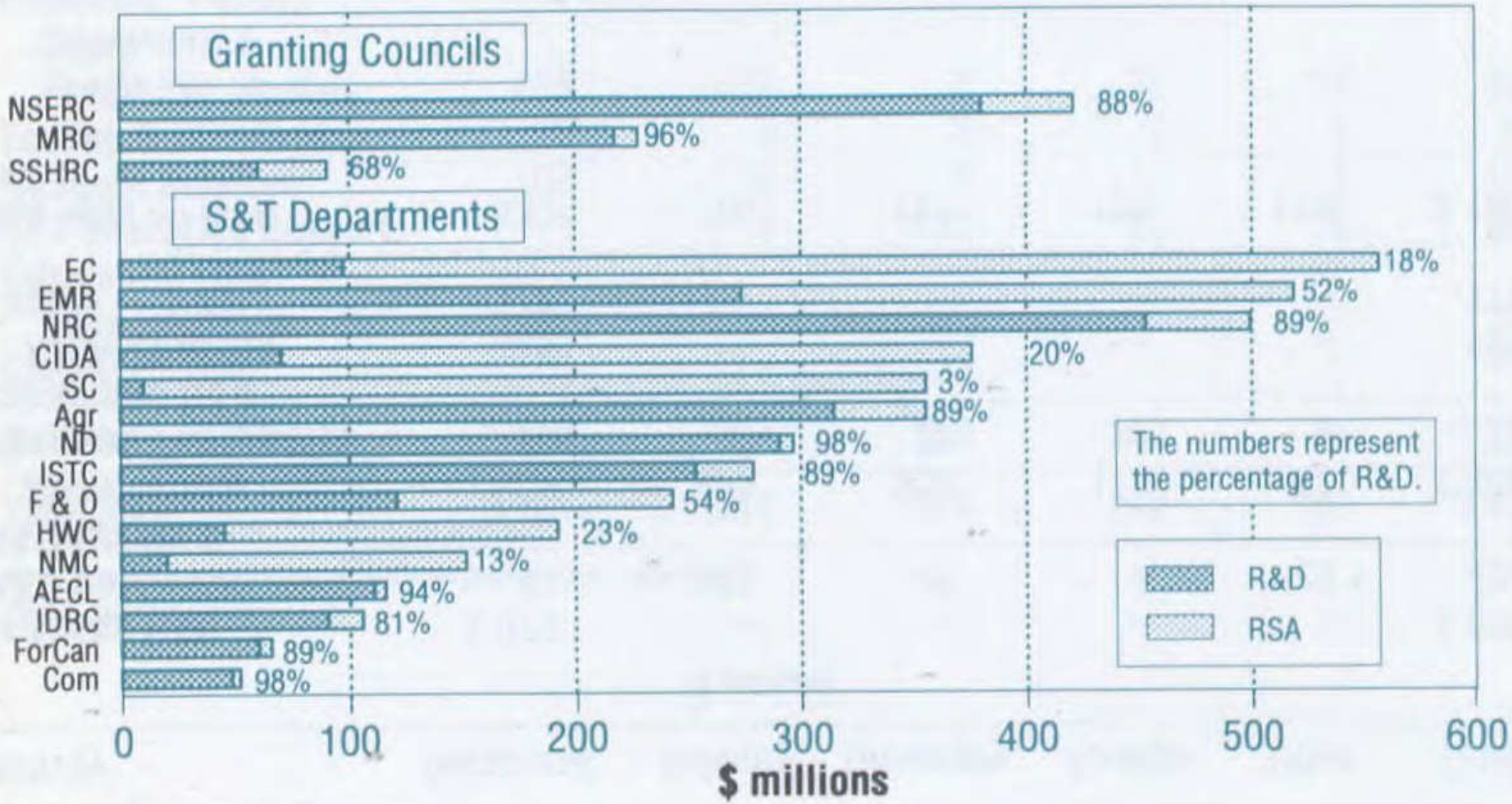
(Transfers of less than $100 million not shown.)

Federal S&T Expenditures

	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91
			($ millions)				
S&T Actual $	4 083	4 140	4 449	4 506	4 816	5 155	5 450
of which:							
Intramural	2 558	2 571	2 790	2 720	2 834	3 010	3 162
Industry	572	611	635	702	792	894	980
University	636	637	663	697	761	805	876
S&T 1981 $	3 469	3 430	3 600	3 493	3 586	3 661	3 738
R&D Actual $	2 454	2 468	2 562	2 581	2 796	3 037	3 180

Source: Statistics Canada.

Estimated Federal S&T Expenditures by Department, 1990-91



Source: Statistics Canada.

Estimated Federal S&T Expenditures by Activity and Performer, 1990-91*

Activity	Intramural	Industry	University	Foreign	Other	Total
		($ millions)				
In-house R&D	1 075	–	–	–	–	1 075
R&D Contracts	41	308	45	7	23	424
R&D Grants & Contributions	–	465	638	114	92	1 308
Research Fellowships	20	3	38	14	0	76
Extramural R&D Administration	125	–	–	–	–	125
Capital — R&D	172	–	–	–	–	172
Sub-total — R&D	1 433	776	721	135	116	3 180

Data Collection	873	47	7	6	26	959
Information Services	356	22	13	42	30	462
Economic, Policy, Operations & Feasibility Studies	125	129	3	35	10	302
Testing & Standards	48	3	0	2	2	56
Museum Services	163	0	0	–	1	165
S&T Education Support	1	3	133	23	6	165
Extramural RSA Administration	41	–	–	–	–	41
Capital — RSA	120	–	–	–	–	120
Subtotal — RSA	1 728	204	156	107	74	2 270
Total S&T	3 161	980	876	242	190	5 450

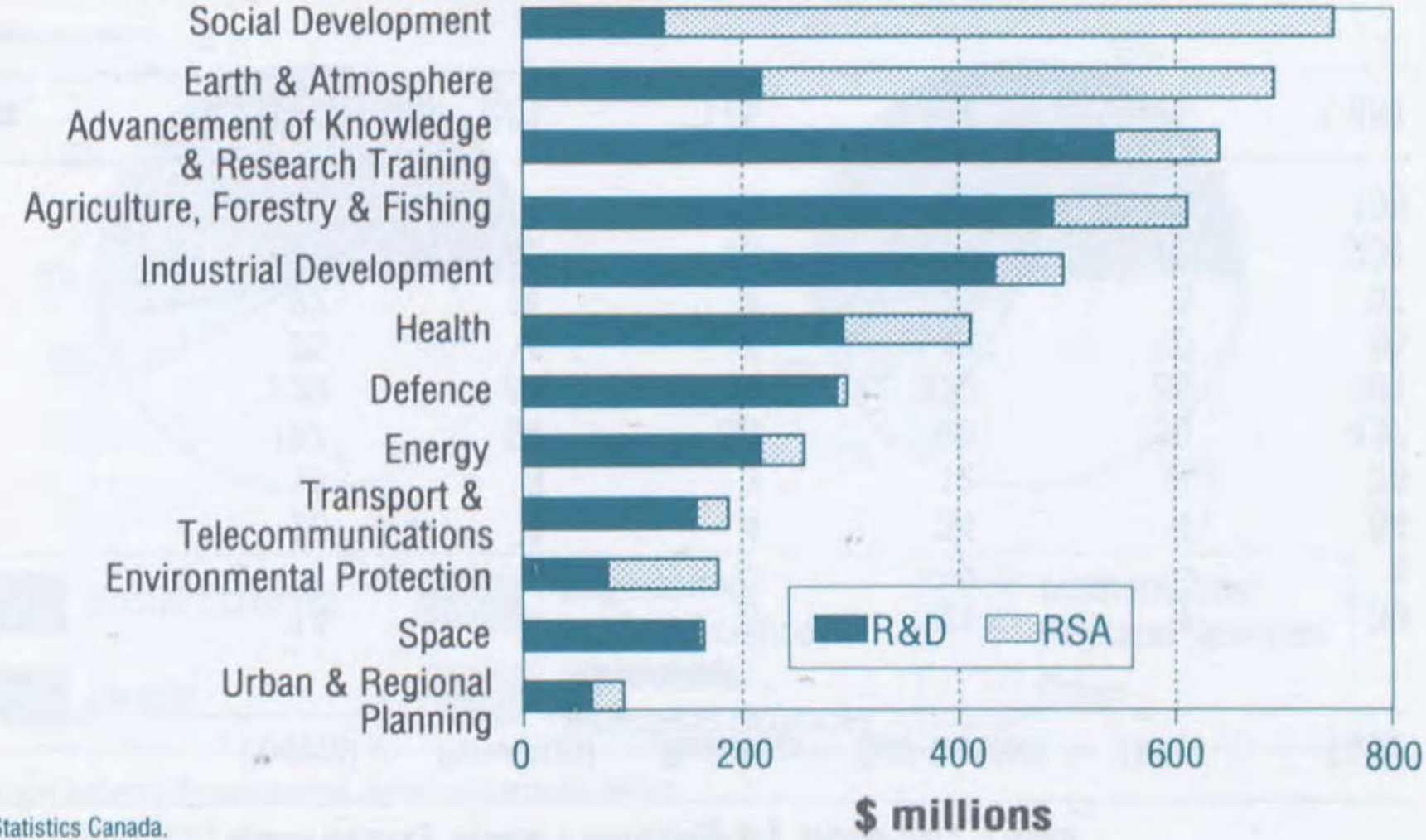
** 0 in this chart represents figures less than $500 000 but greater than 0.*
Source: Statistics Canada.

Federal S&T Expenditures by Province, 1988-89

	Industry	University	Total Extramural	Intramural	Total	Expenditures per Capita
			($ millions)			($)
Nfld.	7	11	22	53	75	132
P.E.I.	3	1	6	9	15	116
N.S.	32	26	64	132	196	222
N.B.	24	10	39	41	80	112
Que. (ex. NCR)	257	207	500	213	713	107
NCR	124	41	181	1 382	1 563	NA
Ont. (ex. NCR)	206	243	496	291	787	83
Man.	15	27	48	104	152	140
Sask.	10	23	37	51	88	87
Alta.	27	59	93	109	202	84
B.C.	51	104	167	134	301	100
Canada*	758	752	1 658	2 547	4 205	162

** Includes expenditures in Yukon and Northwest Territories.*
Source: Statistics Canada.

Estimated Federal S&T Expenditures by Selected Area of Application, 1990-91



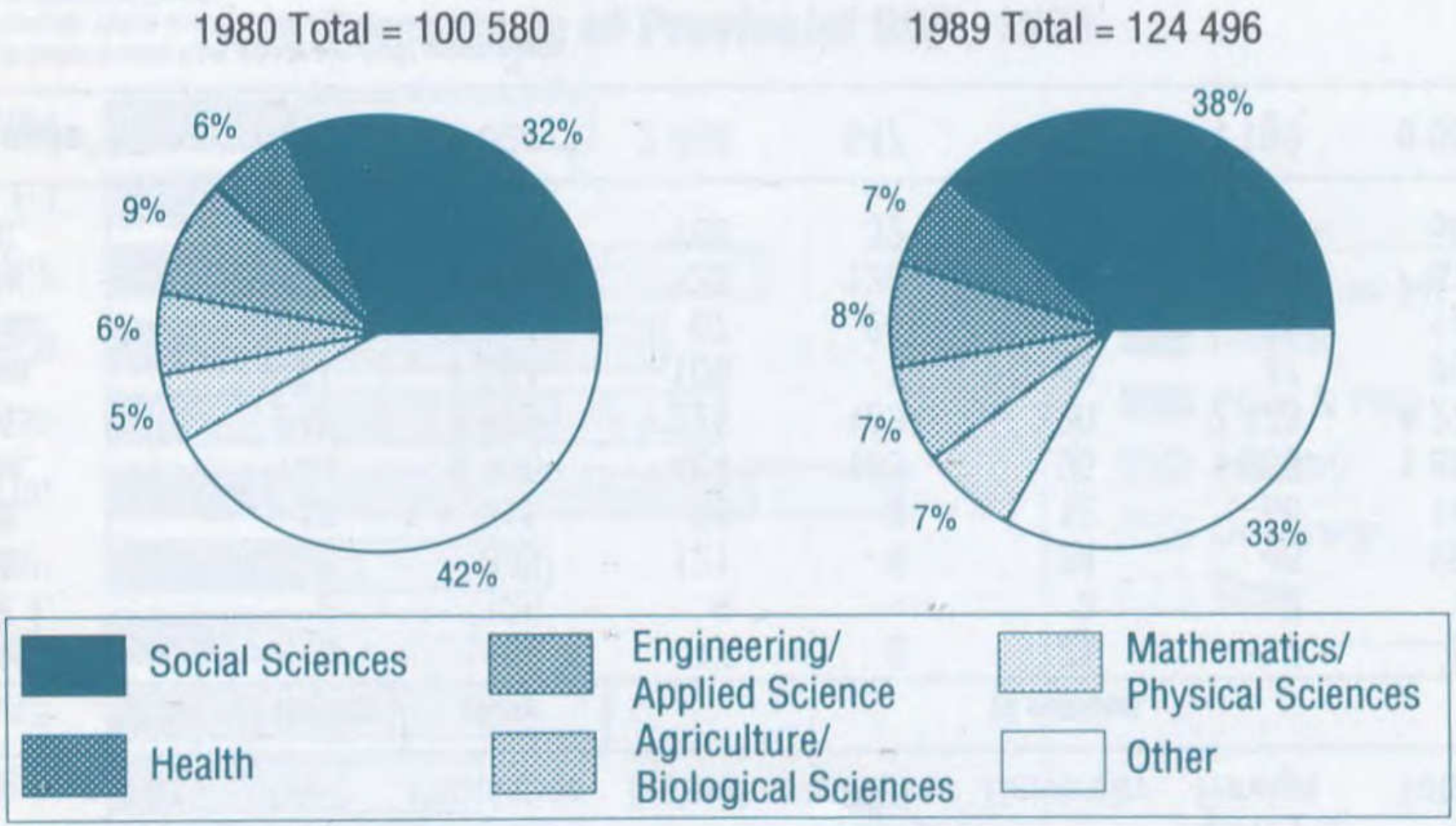
Source: Statistics Canada.

University R&D Funding by Source, 1988

	Federal	Provincial	Business	Self-funded	Other	Total
			($ millions)			
Nfld.	14	–	3	21	1	39
P.E.I.	1	–	–	2	–	3
N.S.	28	4	4	24	4	64
N.B.	11	3	3	12	–	29
Que.	167	94	50	96	30	437
Ont.	239	84	80	320	58	781
Man.	25	4	4	42	10	85
Sask.	22	11	4	18	3	57
Alta.	51	49	18	104	9	231
B.C.	66	11	10	57	11	155
Canada	625	261	175	694	126	1 881

Source: Statistics Canada.

Degrees Awarded in Science and Engineering, 1980 and 1989*



** Includes bachelor's/first professional, master's and doctorate degrees.*

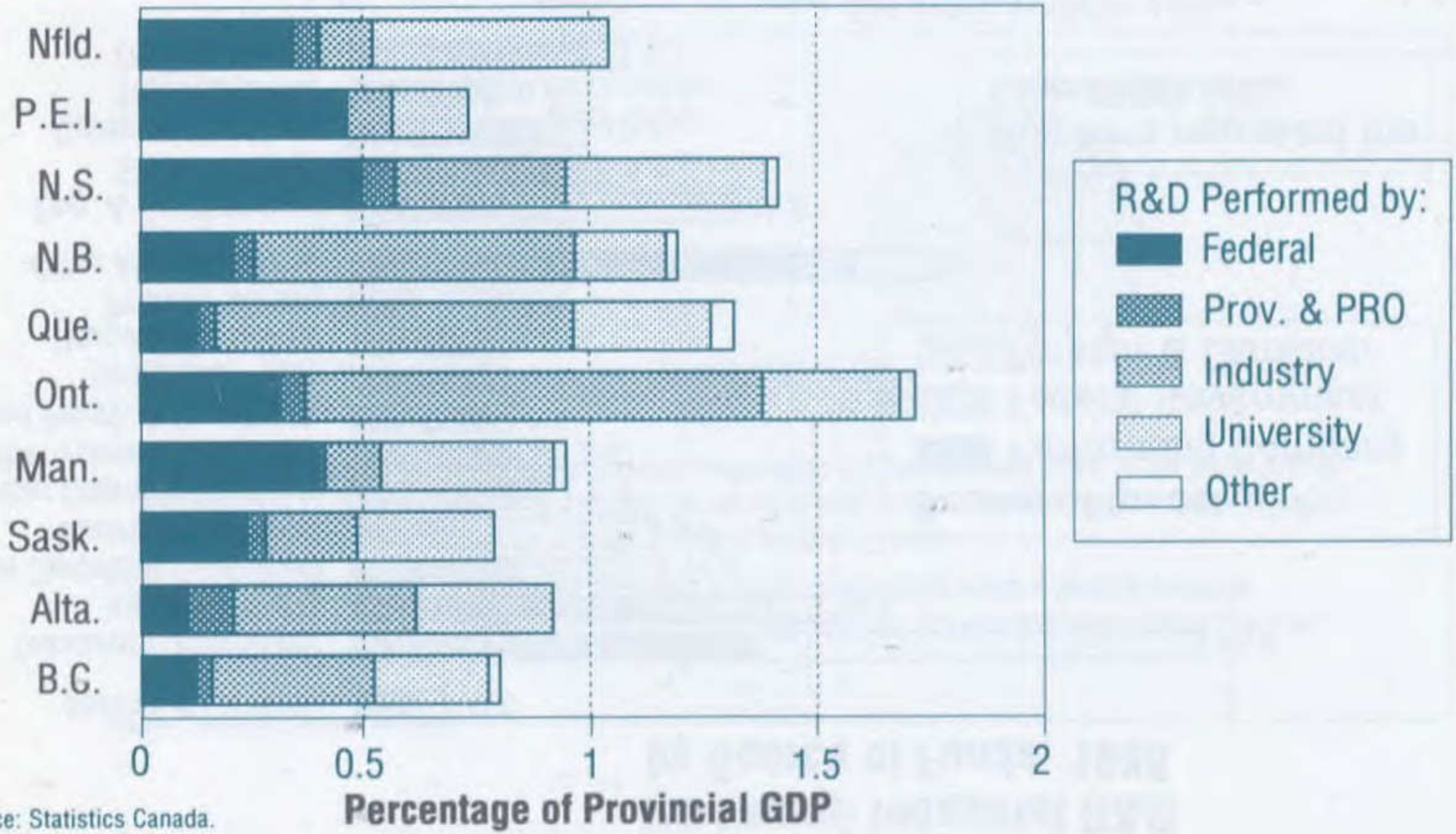
Source: Statistics Canada.

R&D Funding, GDP and Population, by Province, 1988

	GDP	Population	Federal	Prov. & PRO	University	Industry & Foreign	Total*
	($ billions)	(000)	($ millions)				
Nfld.	8	569	47	5	21	7	81
P.E.I.	2	129	9	–	2	2	13
N.S.	15	883	121	9	24	46	206
N.B.	12	715	59	6	12	66	143
Que.	144	6 658	484	183	96	1 056	1 859
Ont.	248	9 489	1 225	163	320	2 473	4 274
Man.	21	1 084	106	7	42	37	205
Sask.	19	1 010	67	21	18	38	146
Alta.	63	2 402	128	120	104	248	610
B.C.	68	3 007	188	32	57	215	509
Canada**	602	26 024	2 436	547	694	4 199	8 058

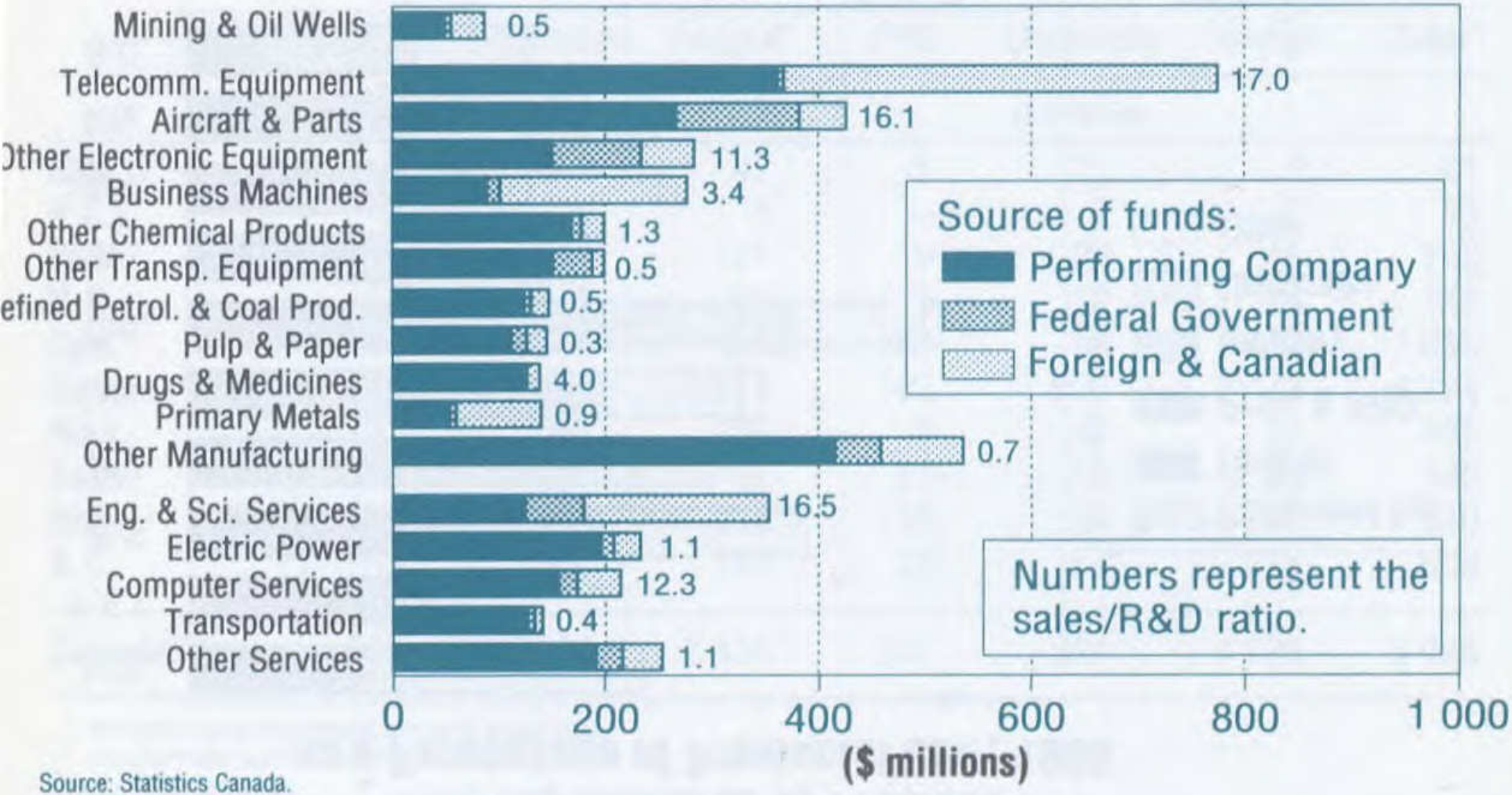
* *Includes funding from private non-profit organizations.*
** *Includes Yukon and Northwest Territories.*
Source: Statistics Canada.

R&D Expenditures by Province as a Percentage of Provincial GDP, 1988



Source: Statistics Canada.

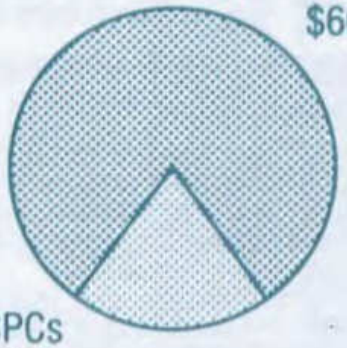
Intramural Industrial R&D by Source of Funds, 1988



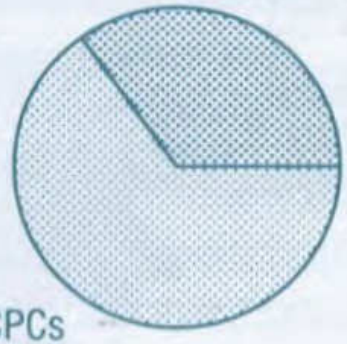
Source: Statistics Canada.

Investment Tax Credit (ITC), 1988

Amount of ITC Earned*



Number of Taxpayer Claims for the 1988 Taxation Year

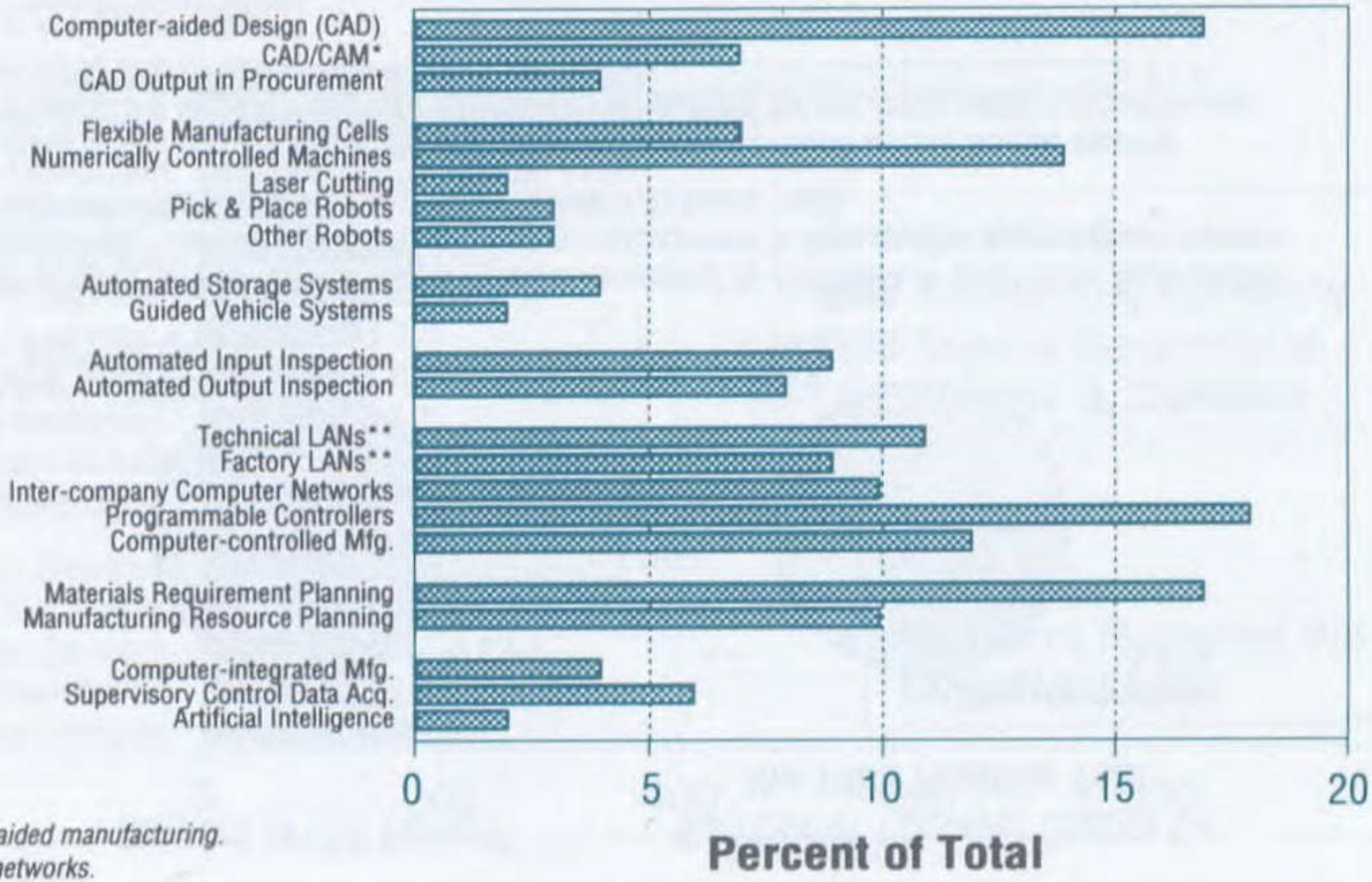


** The amount earned represents the amount requested by the taxpayer prior to an audit and/or assessment. The amount of ITC allowed on assessment is then applied against taxes payable and/or refunded in cash and/or carried forward to future years.*

*** A qualifying CCPC is a Canadian-controlled private corporation whose taxable income (including the taxable income of associated companies) for the immediately preceding year was $200 000 or less.*

Source: Revenue Canada, Taxation.

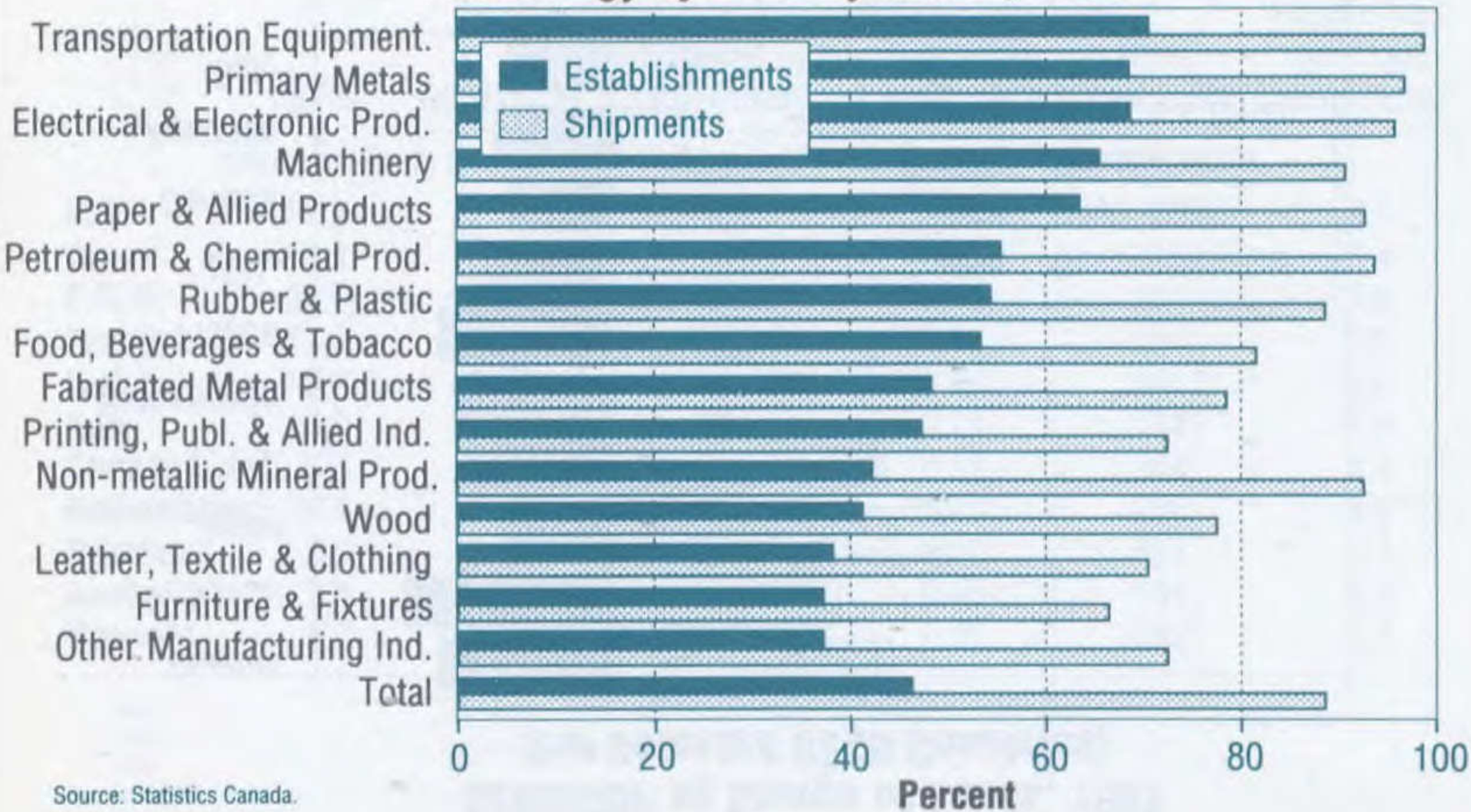
Use of Technologies by Manufacturing Establishments, 1989



* *Computer-aided manufacturing.*
** *Local area networks.*

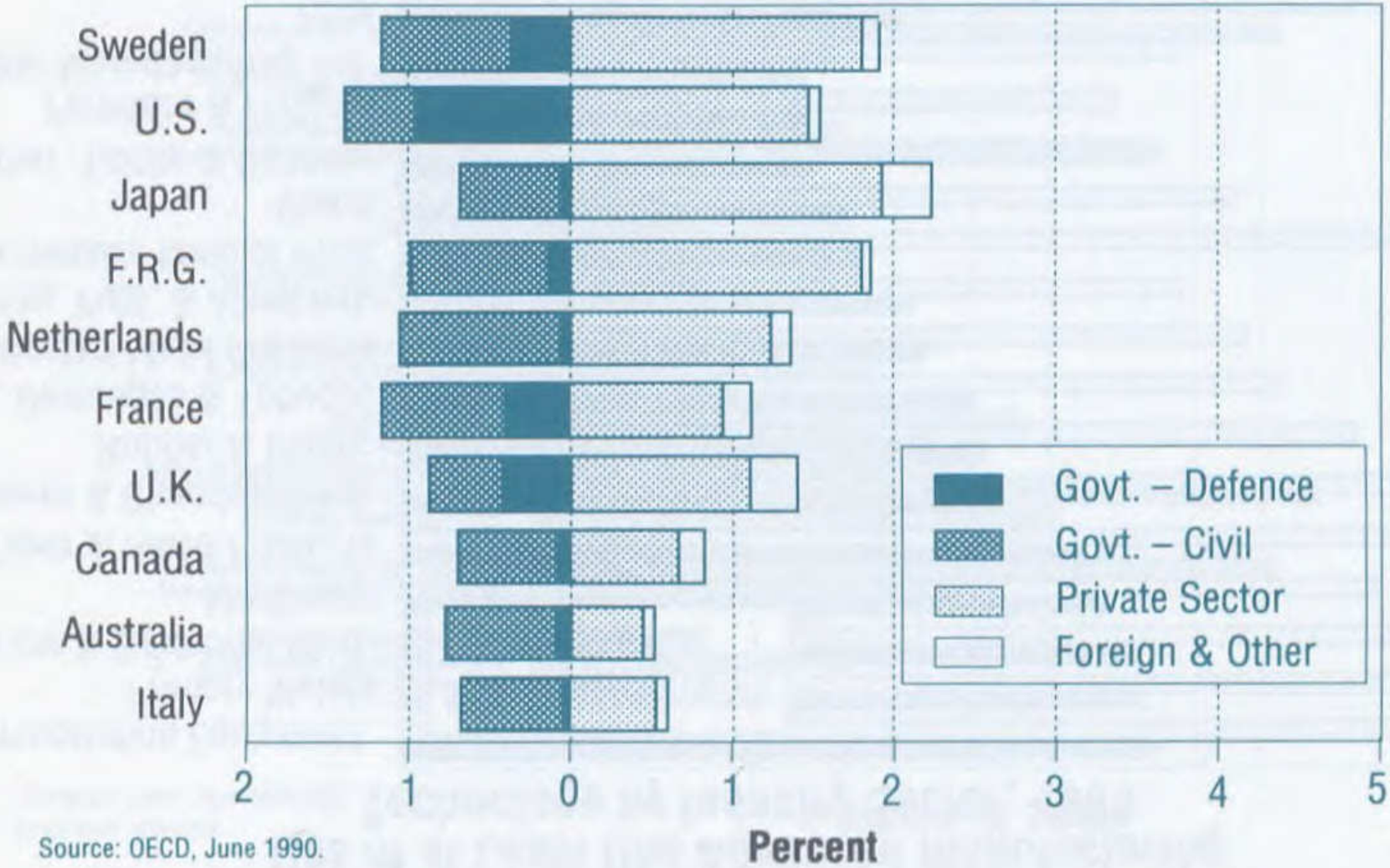
Source: Statistics Canada.

Use of at Least One Advanced Manufacturing Technology by Industry Sector, 1989



Source: Statistics Canada.

GERD/GDP by Source of Funds, 1987
(For Selected OECD Countries)



Source: OECD, June 1990.

Selected International Comparisons of GERD, 1988

	GERD	GERD/GDP	Financed by Government	Govt. R&D Funding/GDP	GERD per Capita	Researchers per 1 000 Labour Force*
	(billions of U.S. $)	(percent)	(percent)	(percent)	(U.S. $)	
U.S.	137.8	2.86	47.0	1.40	560	7.6
Japan	51.1	2.92	21.5*	0.62*	417	8.4
F.R.G.	24.6	2.83	33.9	0.96	401	5.6
France	17.5	2.31	50.6	1.17	314	4.5
U.K.*	16.2	2.27	38.7	0.88	284	4.6
Italy	10.0	1.34	55.1	0.74	174	2.9
Canada	6.3	1.32	44.7	0.59	244	4.4
Netherlands	4.4	2.30	44.3*	1.03*	296	4.2**
Sweden*	3.5	2.99	36.9	1.10	421	5.1
Australia*	2.6	1.19	60.7***	0.75***	161	4.5
Norway*	1.2	1.81	46.8	0.85	285	5.3

* *1987.*
** *1985.*
*** *1986.*
Source: OECD.

Population 15 Years of Age and Over with Qualifications in Science and Engineering, by Selected Occupation, 1986

	Social Sciences	Natural Sciences	Health	All Qualifications	Total Population 15 Years and Over
Managerial & Admin.	69 570	78 855	20 115	168 540	1 047 795
Natural Sciences, Engineering & Mathematics	16 925	176 810	5 055	198 790	469 345
Social Sciences	107 120	8 035	10 085	125 240	260 755
Teaching	53 750	55 320	14 430	123 500	566 375
Medicine & Health	11 090	26 620	436 570	474 280	635 820
Clerical	52 465	40 320	39 125	131 910	2 457 330
Sales	36 885	43 415	17 605	97 905	1 371 510
Service	58 110	66 590	20 460	145 160	1 824 005
Other Occupations	52 760	158 185	35 260	246 205	5 224 845
Not Working	46 245	63 425	120 175	249 845	5 776 330
Total	504 935	737 560	718 865	1 961 360	19 634 100

Source: Statistics Canada.