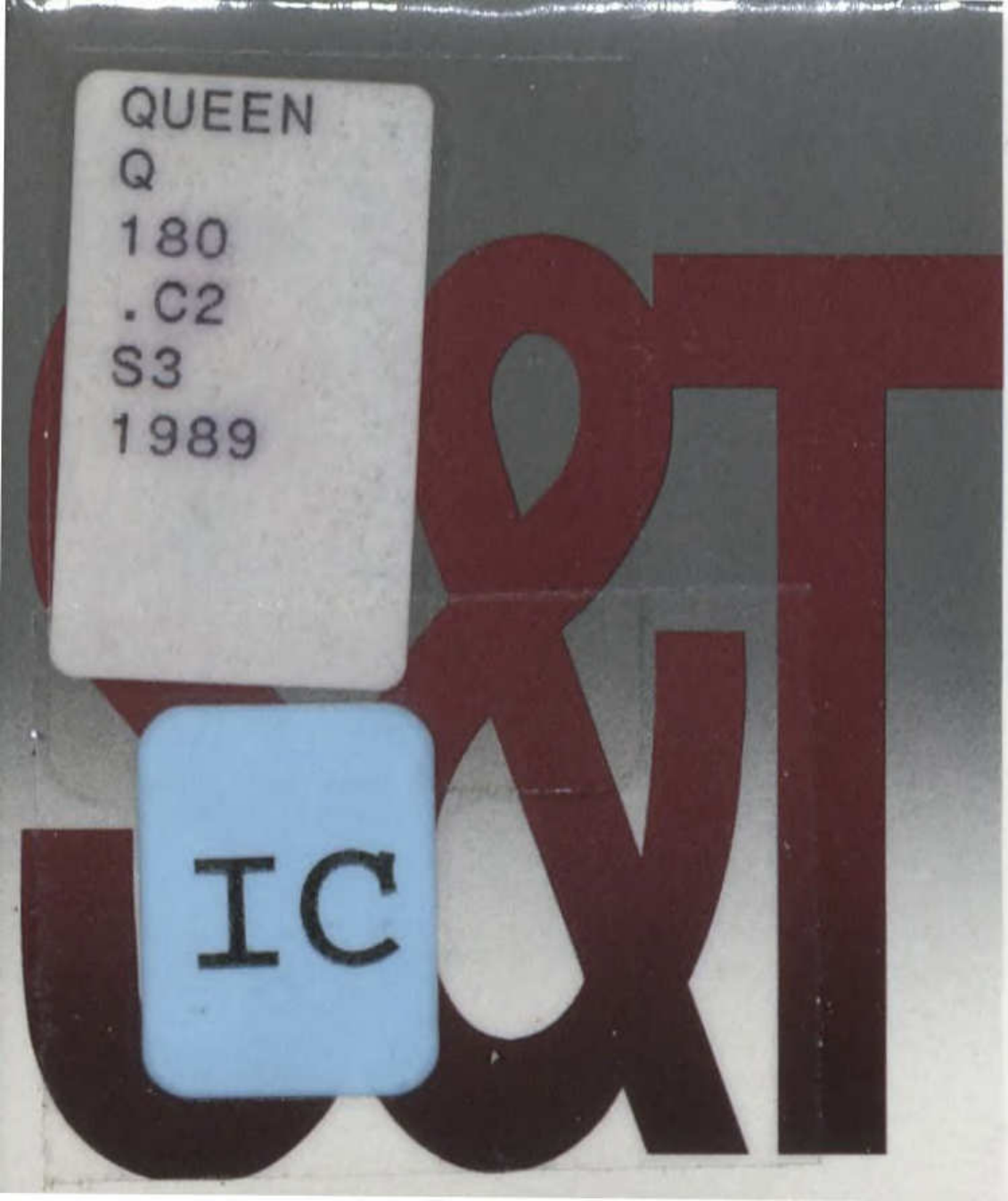


Industry, Science and Technology Canada
Industrie, Sciences et Technologie Canada

SELECTED SCIENCE AND TECHNOLOGY STATISTICS

1989

Canada

S&T

INNOVACTION

The Canadian Strategy for Science and Technology

SELECTED SCIENCE AND TECHNOLOGY STATISTICS

S&T Economic Analysis Division
Industry, Science and Technology Canada
Telephone: (613) 954-3477
Facsimile: (613) 954-1894
October 1989

Table of Contents

Table of Contents (cont'd)

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.* This includes research, development and S&T services, such as technical libraries and routine data gathering, that support research activities.

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.*

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.

For a list of abbreviations used in this publication, please see page 2.

Abbreviations

BE – business enterprise
CCPC – Canadian-controlled private corporation
e – estimate
GDP – gross domestic product
GERD – gross expenditure on research and development
HQP – highly qualified personnel
ITC – investment tax credit
MNE – multi-national enterprise
NCR – National Capital Region
n.a. – not applicable
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

	1982	1983	1984	1985	1986	1987	1988	1989
				($ millions)				
Actual dollars	5 035	5 348	6 015	6 709	7 221	7 395	7 877	8 315
1981 dollars	4 632	4 687	5 110	5 540	5 814	5 706	5 835	5 925*
				(per cent)				
Real growth	8.1	1.2	9.0	8.8	5.1	(1.9)	2.3	1.0*
GERD/GDP	1.34	1.32	1.35	1.40	1.43	1.35	1.32	1.28*

* *ISTC estimate.*
Sources: Statistics Canada and Industry, Science and Technology Canada.

Expenditures on R&D by Funding and Performing Sectors, 1989

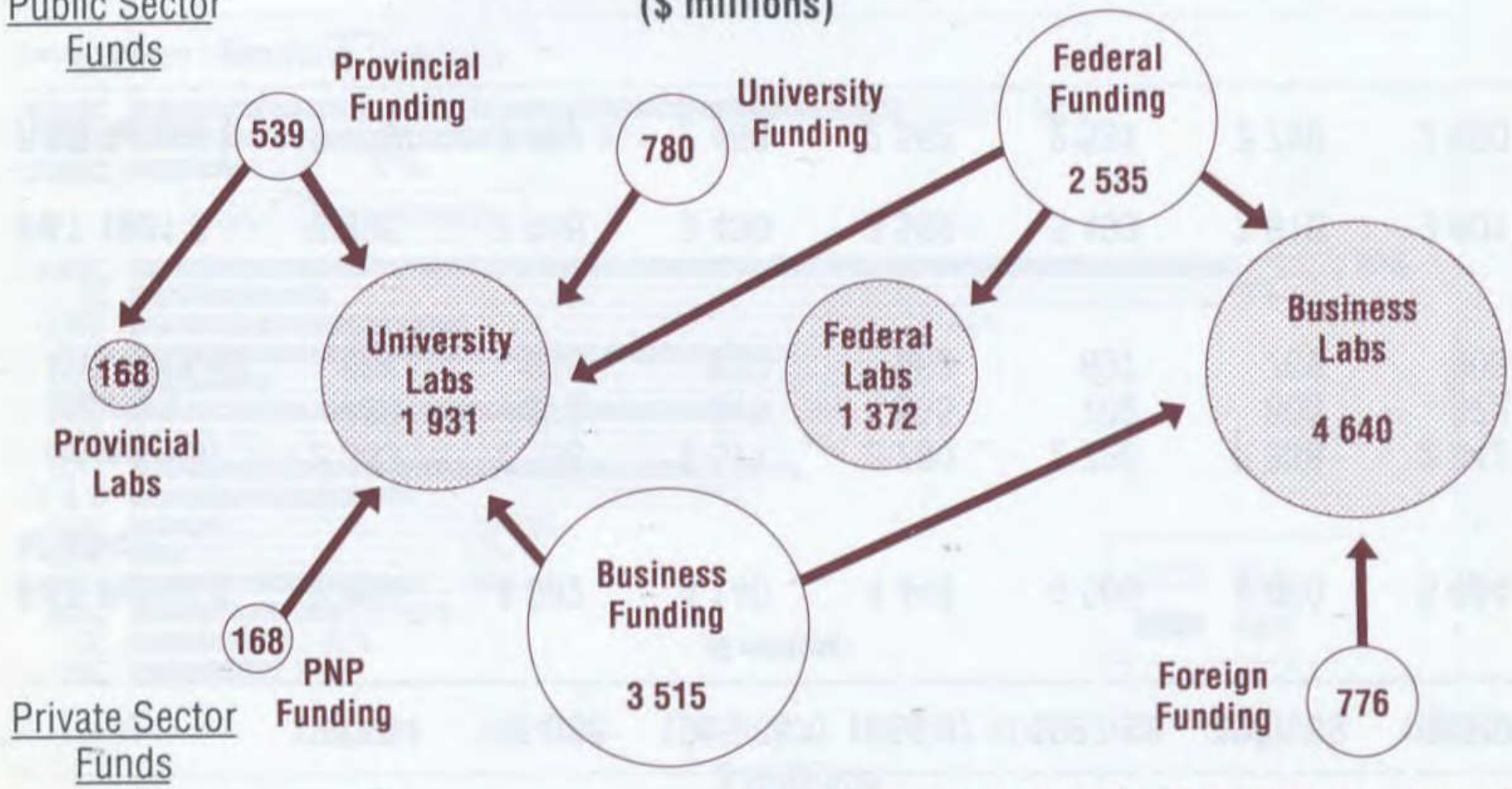
Funder	Performer							
	Federal	Provincial	PRO	BE	University	PNP	Total	Per Cent
				($ millions)				
Federal	1 372	–	8	496	629	30	2 535	30
Provincial	–	168	53	51	244	23	539	6
PRO	–	–	2	–	–	–	2	0
BE	–	–	22	3 332	154	7	3 515	42
University	–	–	–	–	780	–	780	9
PNP	–	–	–	–	111	57	168	2
Foreign	–	–	2	761	13	–	776	9
Total	1 372	168	87	4 640	1 931	117	8 315	
Per Cent	17	2	1	56	23	1		

Source: Statistics Canada.

Canadian R&D Spending Flows, 1989

(Size of symbols is approximately to scale.)

($ millions)



Source: Statistics Canada.

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

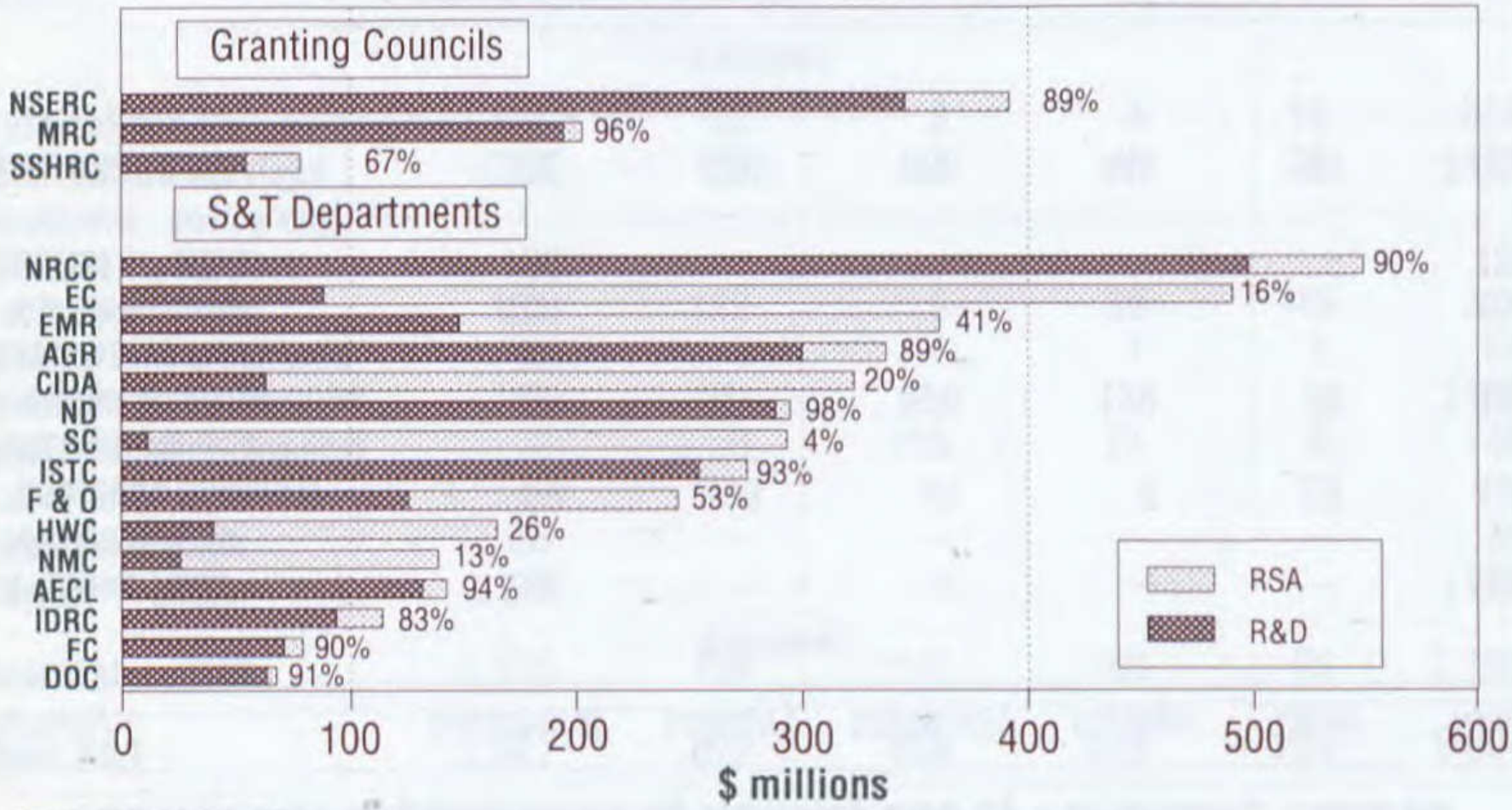
Federal S&T Expenditures

	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90
			($ millions)				
S&T Actual $	3 658	4 082	4 140	4 448	4 506	4 860	5 054
of which:							
Intramural	2 303	2 558	2 571	2 790	2 720	2 838	2 942
Industry	488	572	611	635	702	803	872
Universities	566	636	637	663	697	769	808
S&T 1981 $	3 206	3 468	3 430	3 599	3 493	3 618	3 601
R&D Actual $	2 179	2 454	2 468	2 562	2 581	2 789	2 950

Source: Statistics Canada.

Estimated Federal Expenditures on S&T by Department, 1989

(The numbers following each bar represent the percentage of R&D.)



Source: Statistics Canada.

Federal S&T Expenditures by Activity and by Performer, 1989/90*

Activity	Intramural	Industry	University	Foreign	Other	Total
		($ millions)				
In-house R&D	1 056	–	–	–	–	1 056
R&D contracts (includes support)	69	298	41	6	23	437
R&D grants and research fellowships	20	377	625	139	70	1 230
Extramural R&D administration	104	–	–	–	–	104
Capital — R&D	186	–	–	–	–	186
Sub-total R&D	1 372	674	666	145	93	2 950

Federal S&T Expenditures by Activity and by Performer, 1989/90* (cont'd)

Activity	Intramural	Industry	University	Foreign	Other	Total
		($ millions)				
Data collection	750	53	8	4	19	834
Information services	318	18	12	43	28	419
Economic, policy and feasibility studies and operations	136	122	6	30	40	334
Testing and standards	45	3	1	1	1	51
Museum services	156	–	–	–	–	156
S&T education support	2	3	115	21	6	146
Extramural RSA administration	36	–	–	–	–	36
Capital — RSA	128	–	–	–	–	128
Subtotal — RSA	1 570	198	142	100	95	2 104
Total S&T	2 942	872	808	244	188	5 054

* *Calculated on a basis different from that used to calculate the table on page 13*

Source: Statistics Canada.

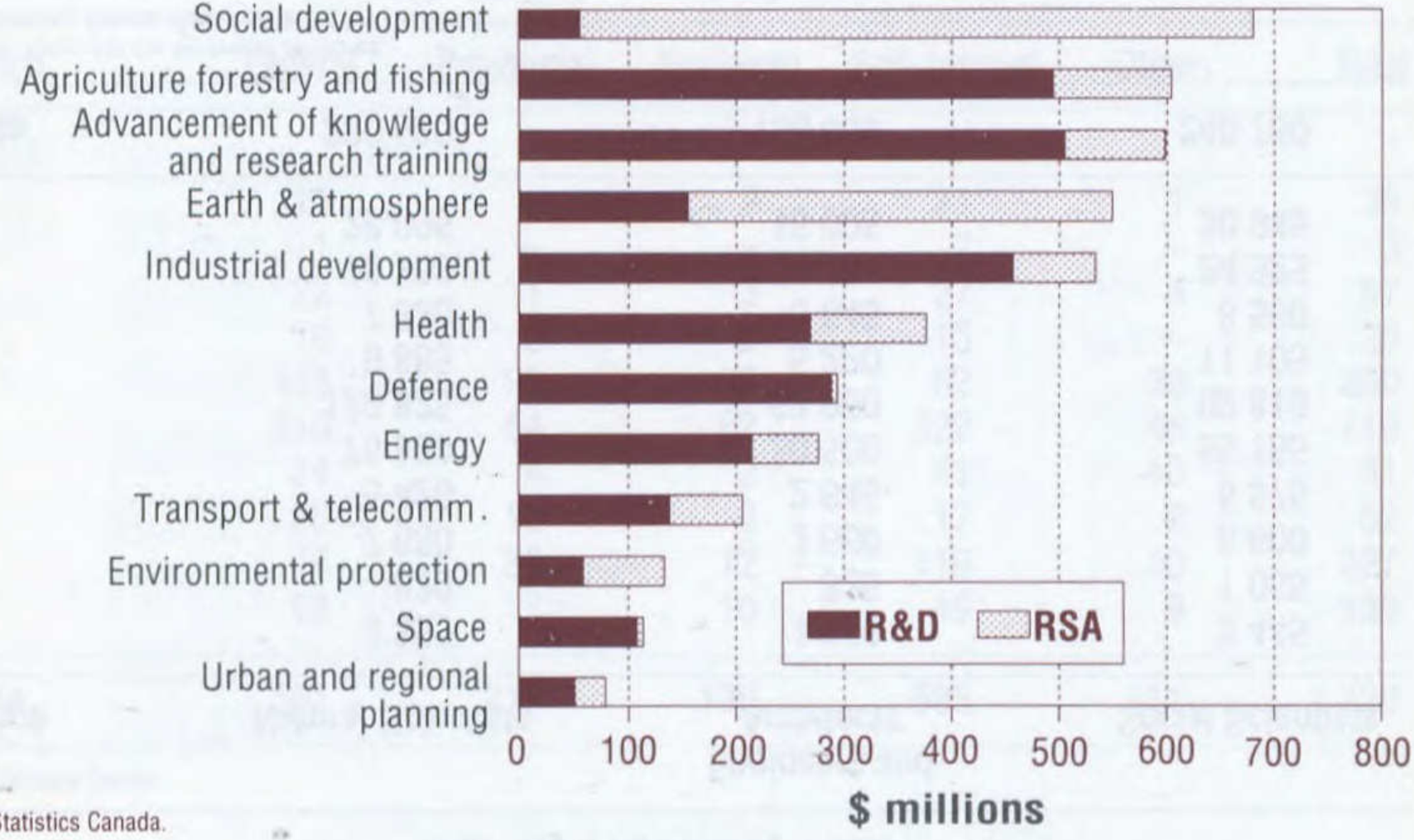
Federal S&T Expenditures by Province, 1987/88

Province	Industry	University	Total Extramural	Intramural	Total	Expenditures per Capita
			($ millions)			($)
Nfld.	5	10	19	50	69	122
P.E.I.	6	1	8	8	16	124
N.S.	24	23	52	131	183	207
N.B.	5	9	19	37	56	78
Que. (ex. NCR)	238	190	461	221	682	109
NCR	95	30	140	1 289	1 429	n.a.
Ont. (ex. NCR)	192	229	463	299	763	90
Man.	16	25	46	93	139	128
Sask.	13	20	40	51	91	90
Alta.	23	56	86	104	190	79
B.C.	54	99	165	136	301	101
Canada*	674	693	1 505	2 443	3 948	152

* *Includes expenditures in Yukon and Northwest Territories.*

Source: Statistics Canada.

Federal S&T Expenditure by Area of Application, 1989/90



Source: Statistics Canada.

HQP by Province, 1986

Province	Natural Scientists	Engineers and Architects	Social Scientists
Nfld.	3 355	1 570	3 445
P.E.I.	820	325	1 055
N.S.	7 630	3 660	6 600
N.B.	5 420	2 645	5 575
Que.	76 830	30 500	55 155
Ont.	120 825	67 960	92 810
Man.	9 885	5 220	11 105
Sask.	7 330	3 645	8 560
Alta.	36 360	21 760	24 325
B.C.	28 095	15 005	30 945
Canada*	296 520	153 800	240 780

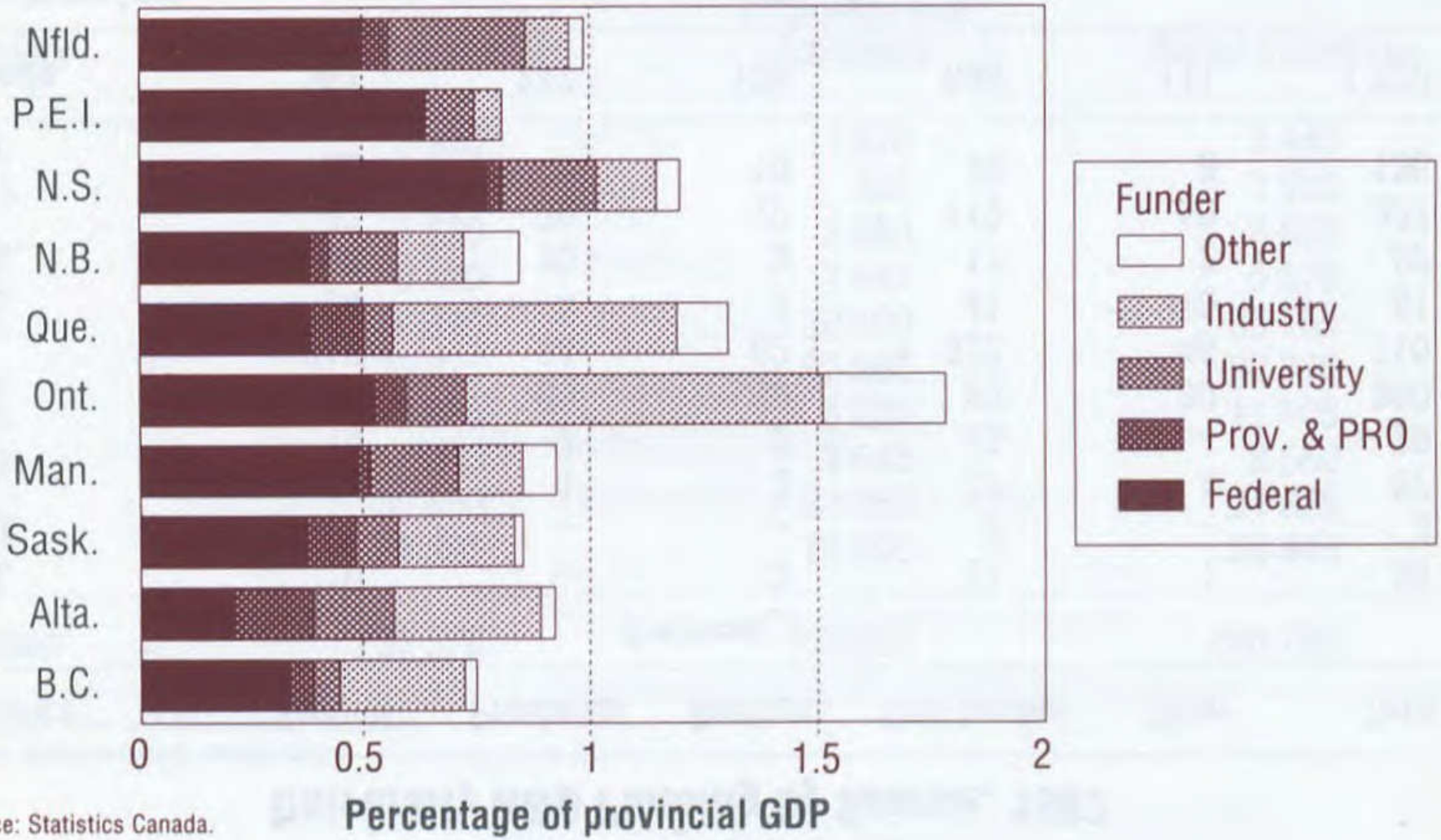
* *Includes Yukon and the Northwest Territories.*
Source: Statistics Canada, Census data.

University R&D Funding by Source, 1987

Province	Federal	Provincial	Business	Self-funded	Other	Total
			($ millions)			
Nfld.	10	–	3	21	1	35
P.E.I.	1	–	–	2	–	3
N.S.	22	1	3	27	4	57
N.B.	10	2	2	15	–	29
Que.	149	90	39	82	30	390
Ont.	216	64	62	322	46	710
Man.	24	4	2	41	10	81
Sask.	20	10	3	17	2	52
Alta.	47	39	12	119	10	227
B.C.	62	7	10	49	8	136
Canada	561	217	136	695	111	1 720

Source: Statistics Canada.

Funding of R&D by Province as a Percentage of Provincial GDP, 1987



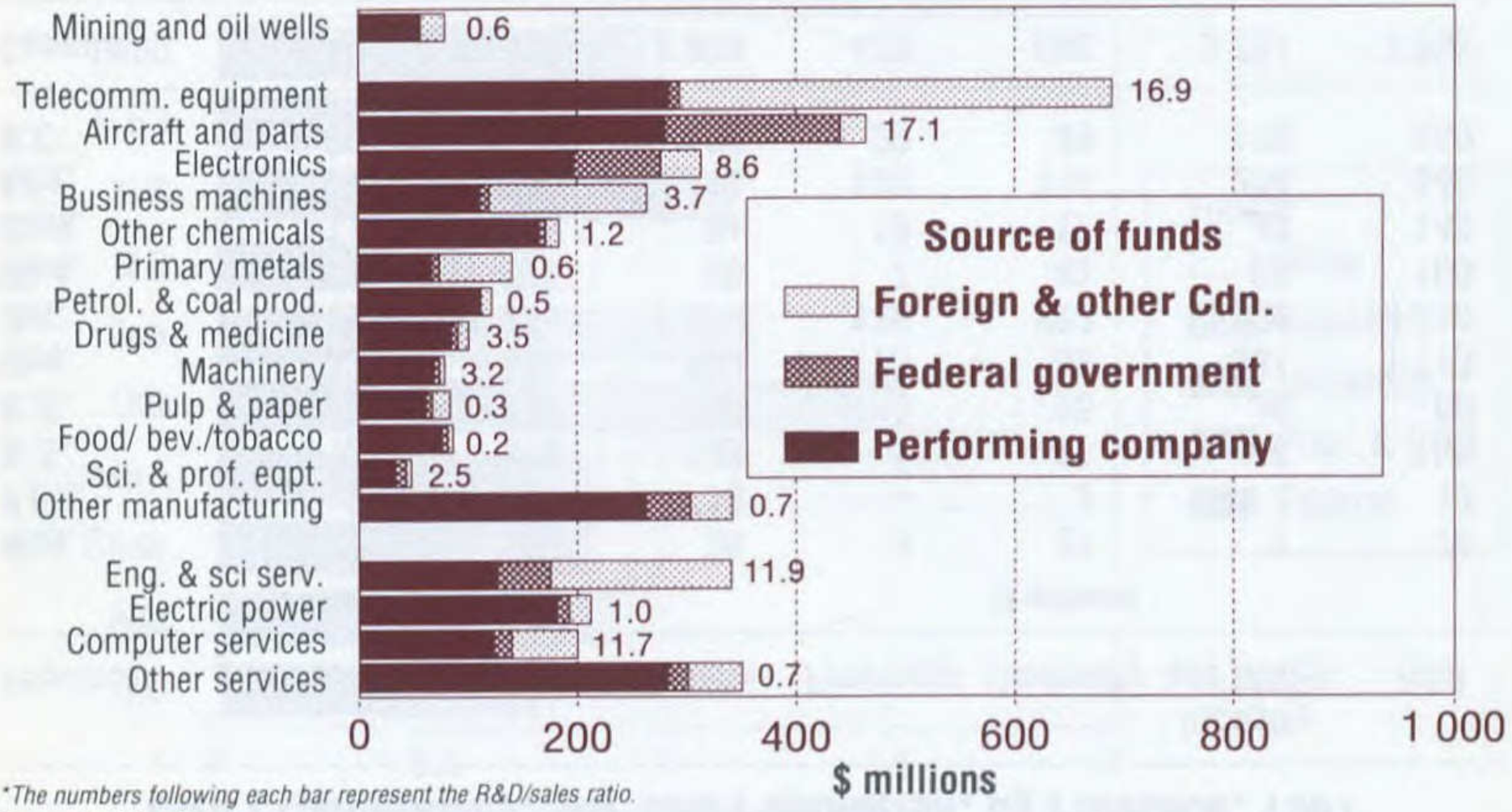
Source: Statistics Canada.

R&D Expenditures, GDP and Population, by Province, 1987

Province	GDP	Population	Federal	Provincial	University	Industry and MNEs	Total
	($ billions)	('000s)			($ millions)		
Nfld.	7	568	36	4	21	7	78
P.E.I.	2	127	10	–	2	1	13
N.S.	13	878	103	5	27	18	159
N.B.	11	712	39	5	15	30	89
Que.	132	6 593	483	175	82	931	1 713
Ont.	225	9 265	1 174	136	322	2 306	4 010
Man.	20	1 079	96	7	41	28	186
Sask.	17	1 016	64	18	17	47	148
Alta.	59	2 378	113	100	119	204	546
B.C.	62	2 925	190	29	49	178	459
Canada	549	25 617	2 309	479	695	3 751	7 395

Source: Statistics Canada.

Intramural Industrial R&D by Source of Funds, 1987*

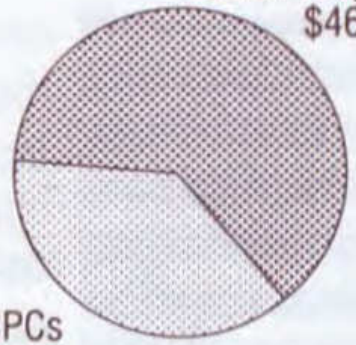


**The numbers following each bar represent the R&D/sales ratio.*

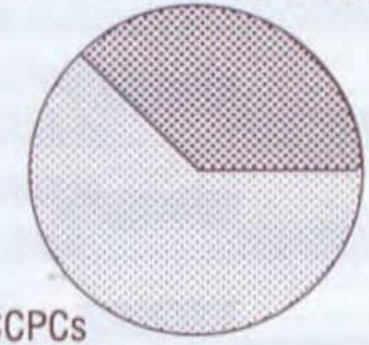
Source: Statistics Canada.

Investment Tax Credit (ITC), 1987

Amount of ITC Earned**



Number of Taxpayer Claims for the 1987 Taxation Year

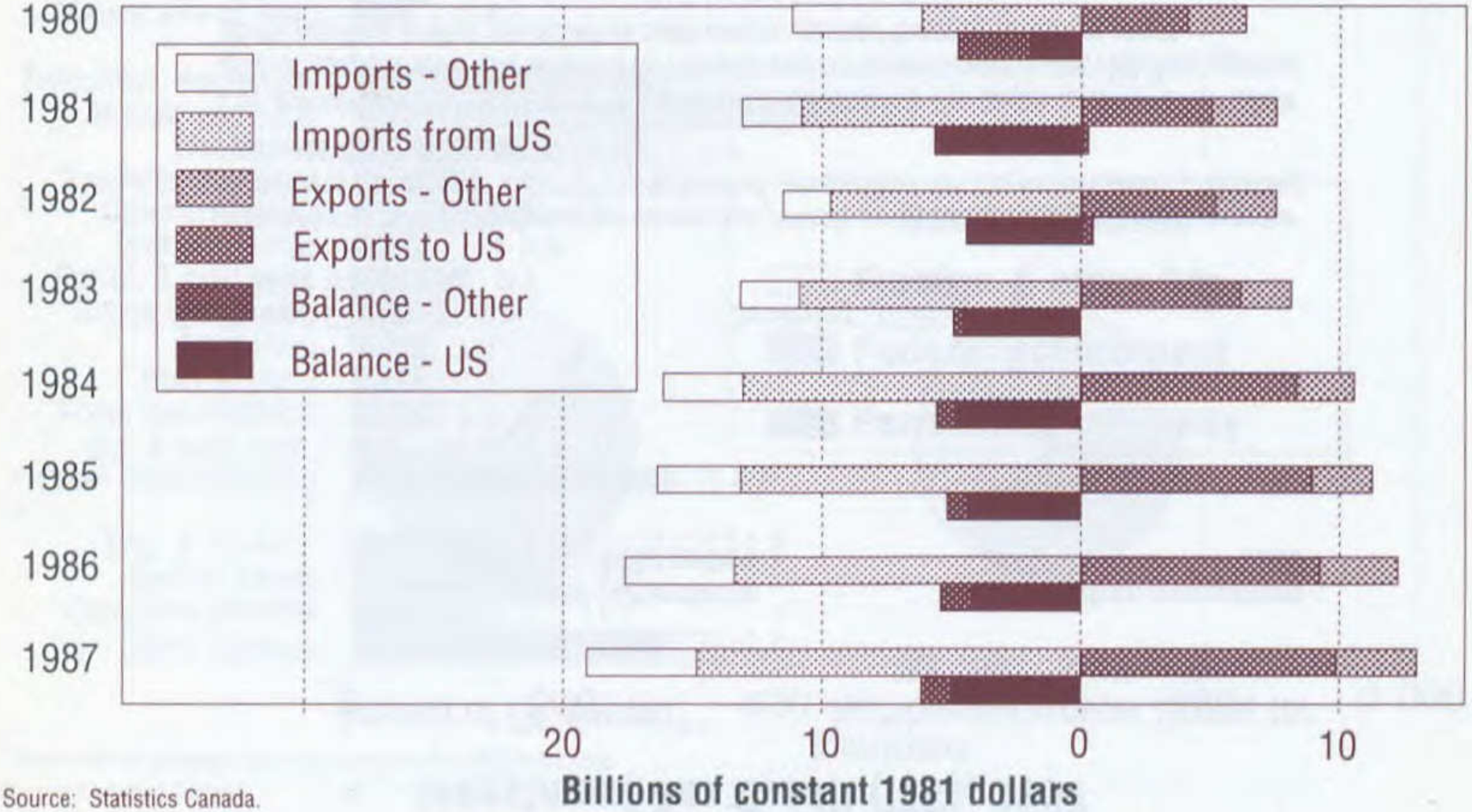


** A qualifying CCPC is a Canadian-controlled private corporation whose taxable income (including the taxable income of associated companies) for the immediately preceding year was $200 000 or less.*

*** 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.*

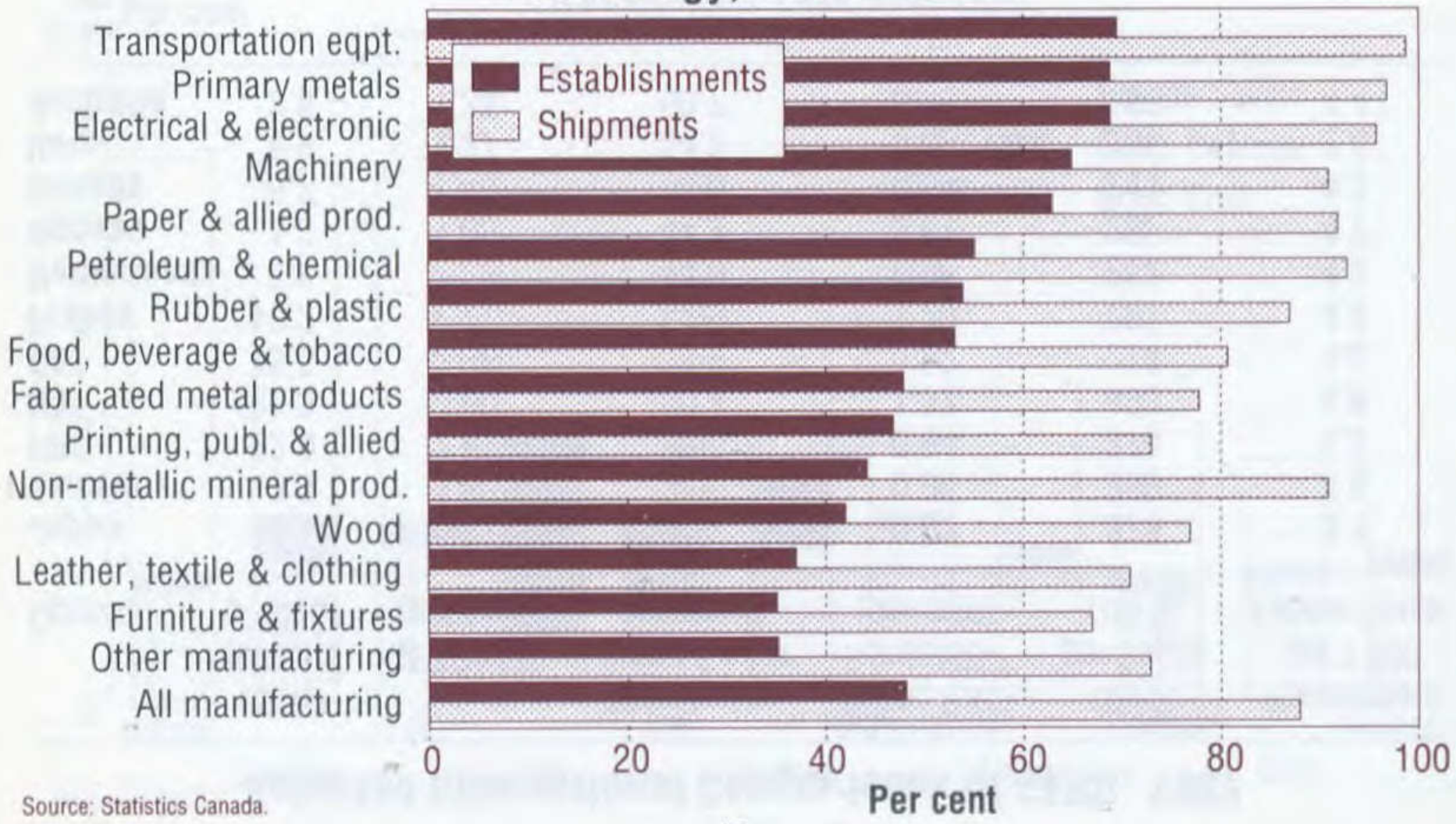
Source: Revenue Canada.

High-technology Trade Between the U.S. and Canada, 1980 to 1987



Source: Statistics Canada.

Use of at Least One Advanced Manufacturing Technology, March 1989



Source: Statistics Canada.

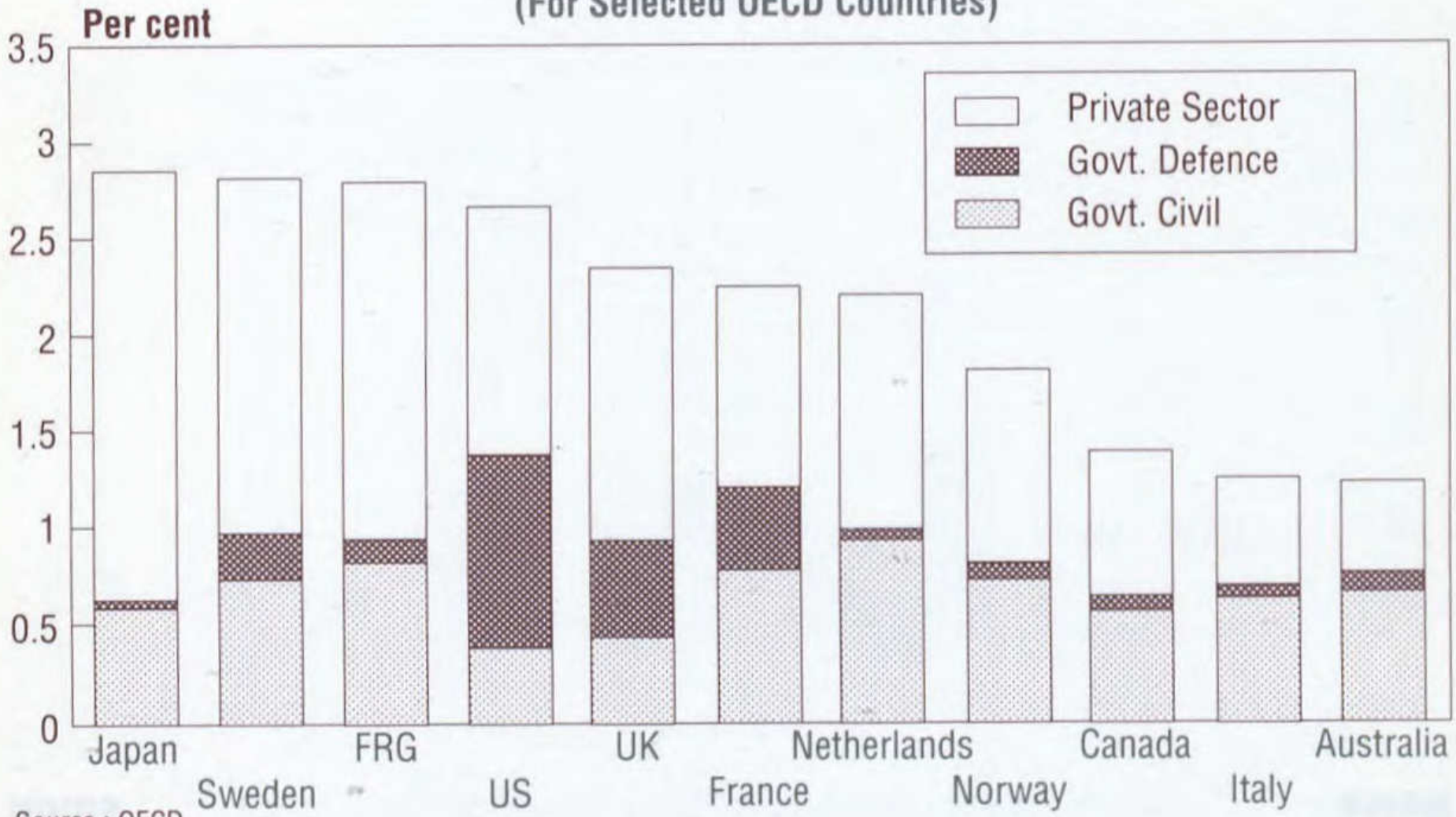
Selected International Comparisons of GERD, 1987

Country	GERD (billions of US $)	GERD/GDP (per cent)	Financed by Public Sector (per cent)	Public R&D Funds/GDP (per cent)	GERD per Capita (US $)	Researchers per 1 000 Labour Force*
Japan	46.1	2.87	21.7	0.62	378	8.1
Sweden	3.3	2.82	34.0**	0.96	388	4.5
FRG	22.9	2.81	33.6	0.94	374	5.2
US	120.3	2.69	50.8	1.37	493	6.6
UK*	15.5	2.36	38.9	0.92	274	n.a.
France	16.2	2.27	52.9	1.20	291	4.4
Netherlands*	3.8	2.22	44.0	0.98	262	4.2
Norway	1.2	1.83	44.1	0.81	282	4.7
Canada	6.2	1.40	45.8	0.64	241	4.3
Italy	8.9	1.27	54.2	0.69	156	2.8
Australia*	2.5	1.25	60.7	0.76	158	4.4

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

GERD/GDP by Source of Funds, 1987

(For Selected OECD Countries)



Source : OECD.

Notes