

**The Measure of Science and the Construction of a Statistical Territory:
The Case of the National Capital Region of Ottawa**

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1. B. Godin, Outlines for a History of Science Measurement.

Introduction

The development and institutionalisation of social statistics is intimately linked to the State.¹ The modern state has from the start always been an important patron and, especially now, an important producer of statistics. What could possibly have motivated governments to invest so much into the measurement of society?

Because of its claim to objectivity – to being a producer of facts² – the science of statistics is of great utility to governments.³ Governments put statistics to two uses. Firstly, statistics serve what Weber considered to be the primary function of science – to enlighten and inform. Governments use science – and statistics – for *instrumental* purposes. Expanding upon this thesis, Foucault suggested that we live in an era of “biopower” in which statistics are used to control populations in complex and often unpredictable ways.⁴ The history of social statistics has devoted considerable attention to this idea:⁵ medical data, civil registers and the census of populations have been described as “technologies” of human control.

Secondly, Statistics are also constructed to serve *symbolic* and *ideological* functions. They certify the credibility and serious-mindedness of its user. They serve to objectify political choices, that is, to eliminate the arbitrariness and

¹ T. M. Porter, *The Management of Society by Numbers*, in J. Krige and D. Pestre, *Science in the 20th Century*, Amsterdam : Harwood Academic Publisher, 1997 : 97-110. E. Brian, *La mesure de l'État : administrateurs et géomètres au XVIIIe siècle*, Paris : Albin Michel, 1994.

² T.M. Porter, *Trust in Numbers : The Pursuit of Objectivity in Science and Public Life*, Princeton : Princeton University Press, 1995.

³ Y. Ezrahi, *The Descent of Icarus : Science and the Transformation of Contemporary Democracy*, Cambridge (Mass.) : Harvard University Press, 1990.

⁴ M. Foucault, *Knowledge/Power*, New York : Pantheon Book, 1980. N. Rose, *Calculable Minds and Manageable Individuals*, *History of the Human Sciences*, 1 (2), 1988 : 179-200. M. Donnelly, *From Political Arithmetic to Social Statistics : How Some 19th Century Roots of the Social Sciences Were Implanted*, in J. Heilbron, *The Rise to the Social Sciences and the Formation of Modernity*, Kluwer Academic Publishers, 1998 : 225-239. A. Firth, *From Oeconomy to the Economy : Population and Self-Interest in Discourses on Government*, *History of the Human Sciences*, 11 (3), 1998 : 19-35. P. Carroll, *Science, Power, Bodies : The Mobilization of Nature as State Formation*, *Journal of Historical Sociology*, 9 (2), 1996 : 139-167. A. Hanson, *Testing Testing : Social Consequences of Examined Life*, University of California Press, 1993.

⁵ I. Hacking, *Biopower and the Avalanche of Numbers*, *Humanities in Society*, 5 (3-4), 1982 : 279-295. I. Hacking, *Making Up People*, in T.C. Heller, *Reconstructing Individualism*, Stanford : Stanford University Press, 1986 : 222-236.

inherent subjectivity of political action by making decisions appear transparent and by lending legitimacy to political discourse.⁶

This article is concerned with the construction of statistics on science and technology for political purposes. It attempts to understand how a statistical organisation – Statistics Canada – could subserve political interests despite its reputation of being a disinterested producer of scientific data.

Comparisons have long been made between the provinces of Quebec and Ontario.⁷ Economic performance, social characteristics of the population and public systems (education for example) are constant objects of comparison for governments. Science and technology are no exceptions. The Quebec government's *Compendium* of scientific and technological indicators and the reports of the Quebec Council for Science and Technology (*Conseil de la science et de la technologie du Québec* (CSTQ)) are full of such comparisons.

In science and technology, an important point of comparison between the provinces is the distribution of federal funding. This issue has been on the Quebec government's political agenda for over twenty years. In 1979, the Quebec government's green paper on science policy presented a series of statistics showing the disparity between Quebec and Ontario in federal spending on science and technology.⁸ More recently, the 1997 edition of the *Compendium* published by the Quebec Office of Statistics (*Bureau de la statistique du Québec* (BSQ)) in collaboration with the Department of Industry, Commerce, Science and de la Technologie (MICST) stated that Quebec received only 14,0% of the federal government's intramural⁹ R&D expenditures against the 60% received by Ontario.¹⁰

Statistics Canada, on the other hand, instead estimates Ontario's share at 20,2% and Quebec's at 12,7%.¹¹ How are such differences possible since both of these

⁶ K. Prewitt, Public Statistics and Democratic Politics, in W. Alonso et P. Starr, *The Politics of Numbers*, New York : Russell Sage Foundation, 1987 : 261-274. K. M. Baker, Science and Politics at the End of the Old Regime, in *Inventing the French Revolution*, Cambridge : Cambridge University Press, 1990 : 153-166.

⁷ R. Dupré, Was the Quebec Government Spending so Little ? : A Comparison with Ontario, 1867-1969, *Journal of Canadian Studies*, 28 (3), 1993 : 45-61.

⁸ *Pour une politique québécoise de la recherche scientifique*, ministère d'État au développement culturel, Gouvernement du Québec, 1979 : 48-49.

⁹ Intramural R-D, as opposed to extramural, is R-D performed in government' own laboratories.

¹⁰ *Compendium 1997 : indicateurs de l'activité scientifique et technologique au Québec*, Québec : BSQ/MICST, p. 13.

¹¹ *Statistics Canada*, Service Bulletin, 88-001, 1997, 21 (7) : 5.

organisations draw from the same data set? It is because, unlike the *BSQ/MICST*, Statistics Canada excludes from Ontario and Quebec the National Capital Region (NCR) where a great number of federal laboratories are located.

It is not self-evident that Statistics Canada should treat the NCR as a statistical entity on par with the provinces. The region is not a political or economic territory for which national accounts are kept or official statistics produced. Though it is, as we shall see, legitimate to produce regional statistics, it is also legitimate to ask why they are produced for the NCR and not for Valcartier or Sainte-Hyacinthe which have federal laboratories of their own.

The hypothesis of this paper is that Statistics Canada's data on federal spending in science and technology is influenced by political interests. By political I mean two things. First, Statistics Canada's mandate to fulfill the science policy needs of the government and its departments. Second, I also refer to the less commonplace politics of Quebec sovereignty. If we subtract the NCR expenditures that are mostly spent on the Ontario side of the region, we diminish Ontario's share to the point that federal spending appears proportionally equal in Ontario and Quebec.

This article analyses the construction of the NCR as a statistical entity. Three dimensions of this construction will be considered. First, the emergence of the NCR and its consolidation. This occurs over the 23 year period between 1972 and 1995. Second, Statistics Canada's justifications for including the NCR in its data. These vary widely but seem to come together in 1995 in an explanation that has since remained stable. And third, the NCR's appearance and integration into a statistical field for motives and interests that have little relation to federal spending.

The sources

This article is based upon an analysis of documents published by Statistics Canada between 1960 and 1998. Statistics Canada produces three types of documents in science and technology. The first is a *Service Bulletin* entitled *Science Statistics*.¹² It presents summary data on the various studies undertaken by Statistics Canada. The bulletin is widely distributed and inexpensive (in comparison with other publications). It serves as the public vehicle for Statistics Canada's results: it includes a selection from a wide range of statistics. At year-end, Statistics Canada collates the bulletin's issues into a

¹² Catalogue number 88-001.

single document called a *Compendium*. The first issue of the bulletin appeared in 1977.¹³ I will examine the series entitled *Distribution of Federal Expenditures on Science and Technology, by Province and Territories*.

The second type of document produced by Statistics Canada on science and technology are called *catalogued* documents. As far as federal spending on science and technology is concerned, these documents range over the entire period under consideration, from 1960 to 1998. The most important documents for the present analysis, those that include the NCR, are the following: *Federal Government Expenditures on Scientific Activities*, published between 1971 and 1977, and *Federal Scientific Activities*, published since 1984.

Finally, the third type of document are non catalogued working papers. This series began during the period when the Science and Technology Division of Statistics Canada was located under the same roof as the Ministry of State for Science and Technology (MOST). The statistical documents produced by the department during this period of cohabitation were also consulted. Annex 1 contains the complete list of analysed documents.

Three operations were carried out on each type of document. The first involved locating the presence of and the form taken by the NCR in the tabulation of data. The second entailed identifying the type of data in which the NCR appeared. And the third consisted in studying the analysis that was made of the region by Statistics Canada.

Statistics Canada's documents are generally identified by the year in which the data were collected. There is, therefore, a two or three year delay before publication. The document *Federal Scientific Activities 1995-96*, for example, was published in 1995 although it presents (revised) data from 1993-94 (with forecasts for the next two years). The year of publication was chosen for the present study. We are interested, after all, in the historical appearance of the NCR in statistics on science and technology and not in the investment of federal funds *per se* in the region.

We are concerned with data of a public nature like those found in the documents mentioned above. There are, to be sure, other data produced by Statistics Canada. These include, for example, the data that Statistics Canada produces in response to requests from provincial governments. However, access to these data is difficult to come by. They are the property of the sponsor and, though

¹³ The bulletin was preceded by another bearing the number 81-001 that had been published by the Education Division since 1971, but it contains – with the exception of the first two issues – next to nothing on science and technology.

such sponsors are public institutions, the public is generally not privy to the information.

Because of the law on the confidentiality of statistical data, access to archives is prohibited. I had discussions with some of the personnel that work in Statistics Canada's division of science and technology, however, to learn about the institution's discourse on the NCR.

The Federal S&T Spending Studies

Statistics Canada periodically conducts five different studies on science and technology in the country. One on business firms (since 1955), a second on provincial research institutions (since 1965), a third on provincial governments (beginning in 1974), a fourth on non-profit organisations (since 1965) and a fifth on the federal government. Universities are not studied in this manner as their expenditures are estimated by indirect means.¹⁴

The first study on federal spending was performed in 1960.¹⁵ It was carried out in collaboration with and by the request of the National Research Council (NRC) which had done this type of study before in 1947. Beginning in 1963, Statistics Canada took over the study and conducted it according to the proposals set out by the OECD in the *Frascati Manual*.¹⁶

The Statistics Canada study has been conducted every two years to the present day. It contains information on the number of monetary investments in science and technology in each of the federal departments and institutions. These investments are categorised according to whether they are allocated to Research and Development (R&D) or to Related Scientific Activities (RSA) and according to whether they are designated for intramural or extramural activities. There is also information on the personnel involved in scientific and technological activities.

The first studies only measured investments in the natural sciences. They began including the social sciences in 1970. Information on the provincial distribution of federal funds began appearing in 1971, the same year that the NCR first appeared in the statistics.

¹⁴ Statistics Canada, *Estimation of Research and Development Expenditures in the Higher Education System*. ST-96-07.

¹⁵ Statistics Canada, 13-515, *Federal Government Expenditures on Scientific Activities*, 1960.

¹⁶ OECD, *The Measurement of Scientific and Technological Activities : Proposed Standards for Surveys of R&D – Frascati Manual 1993*, 5th edition, Paris, 1994.

The Construction of the NCR

The appearance of the NCR in statistics on science and technology did not happen all at once. We may identify three phases in the statistical development and construction of the NCR: an emergence phase (1972-1990); a consolidation phase (1990 and 1995); and a normalisation phase (after 1995).

Emergence: the Black Box NCR

I will trace the introduction of the NCR in the statistics using the *Service Bulletin* and turn to other documents when needed. The Bulletin first appeared in 1977 but the NCR did not appear as a regional entity until 1979.¹⁷ The region was simply referred to as Ottawa rather than as the NCR (Figure 1). The Ottawa region was not yet a unit of observation. In fact, it appeared in parentheses as a complement to data for Ontario. We might qualify the appearance of the region during this period as timid.

Figure 1

Atlantic provinces – Provinces de l'Atlantique
Québec
Ontario (Ottawa)
Manitoba
Saskatchewan
Alberta
British Columbia(3) – Colombie- Britannique(3)
<u>TOTAL</u>

¹⁷ Statistics Canada, 13-003, vol. 3 (2), 1979.

In 1980,¹⁸ the NCR appeared as a distinct entity – as had first been suggested in 1972. It is hence an eleventh entity alongside of the provinces. Since the data is presented from West to East, the NCR is inserted between Ontario and Quebec (Figure 2). For some time thereafter, the data on Quebec and Ontario excluded data pertaining to the NCR. The region was therefore a black box at this period. It was not possible to know the provincial distribution of federal expenditures in the NCR.

Figure 2

British Columbia, Yukon and Northwest Territories - Colombie-Britannique, Yukon et Territoires du Nord-Ouest
Alberta
Saskatchewan
Manitoba
Ontario (excludes NCR - exclus RCN)
National Capital Region (NCR) - Région de la capitale nationale (RCN)
Québec (excludes NCR - exclus RCN)
New Brunswick - Nouveau-Brunswick
Nova Scotia - Nouvelle-Écosse
Prince Edward Island - Île-du-Prince-Édouard
Newfoundland - Terre-Neuve
TOTAL

¹⁸ Statistics Canada, 13-003, vol. 4 (4), 1980.

In 1989,¹⁹ the presentation of data was modified such that, in addition to being treated as a distinct entity, the NCR was now isolated and placed away from the provinces (Figure 3). It was placed after the Canadian total. The expenditures in the NCR were reinserted into those of Quebec and Ontario so that it still remained impossible to know the amount of federal money spent on either side of the Ottawa river.

Figure 3

Yukon and N.W.T. – Yukon et T.N.-O.
British Columbia – Colombie-Britannique
Alberta
Saskatchewan
Manitoba
Ontario
Quebec – Québec
New Brunswick – Nouveau-Brunswick
Nova Scotia – Nouvelle-Écosse
Prince Edward Island – Île-du-Prince-Édouard
Newfoundland – Terre-Neuve
TOTAL
National Capital Region – Région de la capitale nationale

The statistical shape of the NCR continued to fluctuate until 1995. In some documents,²⁰ Statistics Canada referred instead to Eastern Ontario and Western Quebec. Between 1991 and 1994, the NCR completely disappeared from the statistics. Instead, we find a table on the Census Metropolitan Area (CMA) in which is included Ottawa-Hull²¹ (Figure 4).

¹⁹ Statistics Canada, 88-001, vol. 13 (1), 1989.

²⁰ Statistics Canada, 88-206, 1988.

²¹ Statistics Canada, 88-204, 1992 and 1994.

Figure 4

Census metropolitan area
Région métropolitaine de recensement
St. John's
Halifax
Québec
Montréal
Ottawa-Hull
Toronto
Hamilton
Winnipeg
Saskatoon
Edmonton
Calgary
Vancouver
Victoria
Other - Autres
<u>TOTAL</u>

Consolidation: the Transparent NCR

In 1990,²² Statistics Canada introduced a major innovation in its statistics. No longer a black box, the distribution of spending between the two provinces in the NCR was made entirely transparent (Figure 5). It was now possible to identify the portions that were divided between each of the two provinces. The region was no longer a distinct entity, however. Instead, the provincial data was split in two: those concerned with the NCR and those concerned with the rest of the province.

²² Statistics Canada, 88-001, vol. 14 (8), 1990.

Figure 5

Yukon and N.W.T. – Yukon et T.N.-O.
British Columbia – Colombie-Britannique
Alberta
Saskatchewan
Manitoba
Ontario
In National Capital Region – Dans la région de la capitale nationale
Elsewhere in Ontario – Ailleurs en Ontario
Québec
In National Capital Region – Dans la région de la capitale nationale
Elsewhere in Quebec – Ailleurs au Québec
New Brunswick – Nouveau-Brunswick
Nova Scotia – Nouvelle-Écosse
Prince Edward Island – Île-du-Prince-Édouard
Newfoundland – Terre-Neuve
Total

This innovation was short lived. As noted above, between 1991 and 1994 the NCR completely disappeared from the statistics. It returned in 1995, however, with full transparency.²³ There are henceforth two Canadian totals in the tables: one that excludes the NCR, followed by another that includes it (Figure 6). The NCR now has its own tables, moreover, that allow one to precisely identify the portions allocated to Ontario and to Quebec (Figure 7).

²³ Statistics Canada, 88-001, vol. 19 (1), 1995.

Figure 6

Yukon and N.W.T. - Yukon et T.N.-O.
British Columbia - Colombie-Britannique
Alberta
Saskatchewan
Manitoba
Ontario
Québec
New Brunswick - Nouveau-Brunswick
Nova Scotia - Nouvelle Écosse
Prince Edward Island - Île-du-Prince-Édouard
Newfoundland - Terre-Neuve
Canada (Excluding NCR*) - Canada (Excluent le RCN*)
National Capital Region* - Région de la capitale nationale*
Canada (Including NCR) - Canada (Incluent le RCN)

Statistics on federal spending have been presented in this way ever since. The practice of excluding the NCR from the two central provinces and of thereby making it into a statistical entity has hence become the norm of presentation. The reader is left to perform his or her own arithmetic to reconstitute the provincial data that include the NCR.

Figure 7

Activity and Science - Activité et domaine scientifique	Federal Government	Canadian industry	Canadian universities	Other ¹ Canadian performers	Total
	Administration fédérale	Industrie canadienne	Universités canadiennes	Autres ¹ exécutants canadiens	
millions of dollars - millions de dollars					
NATIONAL CAPITAL REGION (ONTARIO) - RÉGION CAPITALE NATIONALE (ONTARIO)					
Research and Development - Recherche et développement					
SSH	17	1	2	3	23
NSE - SNG	6	10	2	10	28
Total	23	11	2	13	50
Related Scientific Activities - Activités scientifiques connexes					
SSH	2	4	10	9	25
NSE - SNG	2	3	3	3	11
Total	4	7	13	12	36
Total Science and Technology - Science et technologie (total)					
SSH	19	5	14	11	49
NSE - SNG	8	13	5	13	39
Total	27	18	19	24	88
NATIONAL CAPITAL REGION (QUÉBEC) - RÉGION CAPITALE NATIONALE (QUÉBEC)					
Research and Development - Recherche et développement					
SSH	8	-	-	-	8
NSE - SNG	2	1	1	1	5
Total	10	1	1	1	13
Related Scientific Activities - Activités scientifiques connexes					
SSH	1	-	-	-	1
NSE - SNG	1	-	-	-	2
Total	2	-	-	-	2
Total Science and Technology - Science et technologie (total)					
SSH	9	-	-	-	9
NSE - SNG	3	-	-	-	3
Total	12	0	0	0	12

Normalisation: the Autonomous NCR

The introduction of the NCR into the statistics was motivated (and created) by the distribution of federal spending. Beginning in 1972, the region appeared among the federal government's intramural expenses. In 1980, it was extended to include federal scientific personnel. That same year, it appeared in the total of federal expenditures rather than only in intramural expenditures. In the mid

1980s, it was again broadened to include extramural federal expenditures, including grants and contracts to universities (1985-90) and industry (1987-90).

The year 1995 marked the extension of the NCR to categories that measure non-federal activities. The NCR is henceforward included in the statistics of Gross Domestic Expenditures on Research and Development (GERD) and in matrices of flows (Figure 8).²⁴ These two types of information are normally reserved for national entities. From this time on, Statistics Canada presented data specific to the NCR in the annual issue of the *Service Bulletin* on the GERD²⁵ as well as a matrix of flows for the NCR (1995) in its ST working papers.²⁶ These matrices are more for form than anything else, however, since they can only be filled by federal expenditures. There are no NCR data for the other sectors.

²⁴ Matrices of flows between sectors (government, university, industry) are designed to mesh R&D funding sources with the research sites of execution.

²⁵ *Statistics Canada*, 88-001, 1996, 20 (9).

²⁶ *Estimates of Canadian Research and Development Expenditures (GERD), Canada, 1987 to 1996*, ST-98-11.

Figure 8

GERD 1987 to 1996 - DIRD 1987 à 1996

National Capital Region - Région de la Capitale nationale

Funding sector	Performing Sector - Secteur d'exécution						Total
	Federal government	Provincial governments	Provincial Research Organizations	Business enterprise	Higher education	Private non-profit	
Secteur de financement	Administration fédérale	Administrations provinciales	Org. de recherche provinciaux	Entreprises commerciales	Enseignement supérieur	Org. privés sans but lucratif	
in millions of dollars - en millions de dollars							
1995 (NSE + SSH) - (SNG + SSH)							
Federal government - Administration fédérale	1 700	0	0	0	0	0	1 700
Provincial Government - Administrations provinciales	0	1 000	0	0	0	0	1 000
Provincial Research Organizations - Org. de recherche provinciaux	0	0	1 000	0	0	0	1 000
Business enterprise - Entreprises commerciales	0	0	0	1 000	0	0	1 000
Higher education - Enseignement supérieur	0	0	0	0	1 000	0	1 000
Private non-profit - Org. privés sans but lucratif	0	0	0	0	0	1 000	1 000
Foreign - Étranger	0	0	0	0	0	0	0
Total	1 700	1 000	1 000	1 000	1 000	1 000	7 000
1996 (NSE + SSH) - (SNG + SSH)							
Federal government - Administration fédérale	1 700	0	0	0	0	0	1 700
Provincial Government - Administrations provinciales	0	1 000	0	0	0	0	1 000
Provincial Research Organizations - Org. de recherche provinciaux	0	0	1 000	0	0	0	1 000
Business enterprise - Entreprises commerciales	0	0	0	1 000	0	0	1 000
Higher education - Enseignement supérieur	0	0	0	0	1 000	0	1 000
Private non-profit - Org. privés sans but lucratif	0	0	0	0	0	1 000	1 000
Foreign - Étranger	0	0	0	0	0	0	0
Total	1 700	1 000	1 000	1 000	1 000	1 000	7 000

Finally, beginning in 1995, Statistics Canada extended the data on the NCR backwards to 1985. Federal spending, the GERD (back to 1979) and the flux matrices (1987) were treated in the same way.

Table 1 presents an historical summary of the information that Statistics Canada produced for the NCR. On the whole, statistics on the NCR are increasingly normalised over time. While giving the region a recurrent existence, Statistics Canada also attempted to give it an existence that was independent of federal expenditures.

Justification for the NCR

The Statistics Canada study on federal spending has attempted, since 1960, to identify and measure the range and magnitude of federal expenditures in science and technology. Beginning in 1984, a section was introduced that included a detailed presentation of expenditures across departments.²⁷ Between 1985 and 1988, Statistics Canada published a *Directory of Federal Government Scientific and Technological Establishments*.²⁸

The provincial distribution of federal spending appeared for the first time in 1972. The analysis of the range of federal spending was now coextensive with the country's *geographical range*. There were attempts to identify the existence of federal departments and activities in each of the provinces.²⁹ As is usually the case with Statistics Canada, however, the discussion of the problem was very short: a few paragraphs at best. Yet the numbers grew rapidly. In 1977, an annual issue of the Service Bulletin was introduced on provincial distribution and, in 1992, a special section on this topic was added to the principal document on federal spending (Table 2).³⁰

²⁷ Statistics Canada, *Federal Scientific Activities*, 88-204.

²⁸ Statistics Canada, 88-206.

²⁹ Statistics Canada, 13-202.

³⁰ Statistics Canada, *Federal Scientific Activities*, 88-204.

Table 1 – The Statistical Evolution of the NCR

	Federal expenditures	Federal personnel	Grants and Contracts	External expenditures	Independent tables	Matrices of flows	GERD	CMA
1960								
1961								
1962								
1963								
1964								
1965								
1966								
1967								
1968								
1969								
1970								
1971								
1972	X	X						
1973	X							
1974	X						X	
1975	X							
1976	X							
1977	X	X						
1978								
1979	X			X				
1980	X	X						X
1981	X	X						X
1982	X	X						X
1983	X	X						X
1984	X	X						X
1985	X	X						X
1986	X	X						X
1987	X		X	X				
1988	X		X	X				
1989	X		X	X				
1990	X		X	X				
1991								
1992								X
1993								
1994								X
1995	X				X	X		
1996	X	X			X	X		
1997	X				X	X		
1998	X	X			X	X		

Black box

transparency

Table 2 – Documents on the Provincial Distribution of Federal Spending

1960	First Study on Federal Spending Expenditures on S&T
1972	First Statistics on Provincial Distribution (13-202)
1977	Annual Issue on Provincial Distribution (88-001)
1985	Directory of Federal Scientific and Technological Establishments (88-206)
1992	Specific Section on Provincial Distribution (88-204)

Beginning in 1984, the distribution of federal spending allocated to each province was made the object of brief analyses by Statistics Canada. The analyses first noted that the NCR received the lion's share of federal expenditures and then discussed the proportions allocated to Ontario and Quebec.³¹ A few years later, it would be explicitly admitted that "More funds were spent in Ontario (53%) than in any other region."³² They went on to add, however, that these expenditures were inflated by the heavy concentration of government spending in the NCR.

These texts were often accompanied by statements that attempted to justify the NCR. These justifications were of two types: defensive and explanatory. Statistics Canada submitted three defensive arguments. First, though the largest portion of expenditures is confined to the NCR, "there are significant expenditures in *all*³³ regions".³⁴ Second, "Federal government establishments provide national S&T and R&D facilities as a service to Canadian industry, governments, universities and the Canadian public".³⁵ And third:

It would be wrong to assume all of the expenditures of a unit³⁶ are spent in the region of location. Supplies and equipment can be purchased from other regions or countries. Furthermore, in cases such as the National Capital Region, labour moves freely between the two provinces so that even wages and salaries paid by a unit is partly spent outside the area of location.³⁷

³¹ Statistics Canada, 88-204, 1986 : 2.

³² Statistics Canada, 88-204, 1990 : 8.

³³ Emphasis added.

³⁴ Statistics Canada, 13-202, 1972 : 26.

³⁵ Statistics Canada, 88-204, 1995 : 79.

³⁶ A laboratory for example.

³⁷ Statistics Canada, 88-204, 1997 : 79.

But the ostensibly explanatory argument, repeated since 1995, is the following:

The reason for treating the intramural S&T expenditures in the NCR as a separate category is the following. Whether or not these expenditures accrue to one side of the Ottawa River or the other is fortuitous. It depends on the location of the particular federal agency performing the S&T and could be changed merely as a result of the way in which office space is allocated within the NCR.^{38 39}

The real reason is, in fact, a historical one. We should keep in mind that governments have always concentrated their research laboratories in close proximity to the departments for which they were created to support. It has not been until very recently that they began decentralising their activities. We need only think of the CNRS in France or of the National Research Council (NRC) in Canada. The only exception to this rule is the United States where federal laboratories are distributed throughout the entire country (though there are concentrations in California, Texas, Florida and Washington). Like most governments, the Canadian government simply placed its laboratories in its capital city: Ottawa (we should not forget that the NCR – which includes Hull - did not exist at the beginning of the century when National Research Council's laboratories were established). The real reason for the funding wealth of the NCR, therefore, is the fortuitous choice that was made over a century ago when it was decided that the national capital would be located in Ontario and not in Quebec. Once this decision was taken, the establishment of laboratories ensued without any explicit discrimination against Quebec.

The Statistical Impact of the NCR

In 1996-97, the NCR is responsible for 37,3% of internal federal spending.⁴⁰ The share of funds spent on the Ontario side of the NCR is 97,4%, leaving 2,6% for Quebec. As for NCR personnel, 87,6% are located on the Ontario side. Using data published before 1995 and the more transparent data that followed, we may determine the impact that excluding the NCR has on the provincial data (Table 3). It is clear that the portion of federal expenditures and personnel in Ontario is reduced by two thirds if the NCR is excluded from the province.⁴¹ More

³⁸ Statistics Canada, 88-001, 19 (1) : 2.

³⁹ The word «fortuitous» is dropped in 1996 but the rest of the argument is preserved.

⁴⁰ Statistics Canada, 88-001, 22 (6).

⁴¹ Statistics Canada, 88-001, 22 (6) et 88-001, 22 (3).

interesting still is the effect on the provincial GERD.⁴² Over the whole period for which figures are available, Ontario's GERD/GDP is greater than Quebec's. For example, in 1994 (the last year for which figures are available), Ontario's GERD/GDP is 2,0% against 1,8% for Quebec. Once the NCR is excluded from the two provinces, however, Quebec's GERD/GDP is (slightly) greater than Ontario's, thus 1,9% against Ontario's 1,8% in 1994.

Table 3 – Provincial Distribution (%) of Federal Funds According to Whether the NCR is Included or Excluded from the Statistics

	NCR Included	NCR Excluded
Intramural federal spending (1996-97)		
Québec	13.8	12.7
Ontario	61.6	20.2
Federal scientific personnel (1996-97)		
Québec	16.3	9.5
Ontario	60.7	13.0
GERD/GDP (1994)		
Québec	1.8	1.9
Ontario	2.0	1.8

Explanatory Factors

The presence of the NCR in Statistics Canada's documents may be subsumed within three great periods. A black box period between 1972 and 1989. A second period of four years (1991-1994) during which the NCR is totally absent from the statistics. And a final period of transparency from 1995 on. These three periods overlapped with three political events.

⁴² Statistics Canada, 88-001, 20 (9).

Science policy

The federal government put together two important commissions during the 1960s. The Glasco commission⁴³ on government organisation and the Lamontagne commission⁴⁴ on science policy. Both commissions criticised the government for developing scientific institutions and programs in the absence of a unifying structure or an explicit long-term strategy. They especially criticised the government for taking on too much of the research performed in the country at the detriment of industry which had been the apparent target, at any rate, of government intervention since the beginning of the century. The same observation was made by the OECD in a study on Canada in 1969.⁴⁵ The federal government then performed 36% of all R&D in Canada while most OECD countries conducted around 20%.

In 1971, the federal government created MOST with the mandate, among others, to draw up an inventory of R&D in the country in line with the recommendations of the Lamontagne report. In the spirit of the Glasco report, it was likewise assigned the Treasury Council task of tracking department expenditures in science and technology. These tasks were performed in collaboration with Statistics Canada. MOST published a document on federal scientific activities between 1971 and 1974, a few years prior to Statistics Canada's analysis of the geographical distribution of federal expenditures. Then between 1977 and 1983, the Statistics Canada personnel responsible for statistics on science and technology were assigned to MOST in order to improve coordination for the study on federal government expenditures whose results were used for budget estimates. During this period, MOST published what is known as the red book – the substitute for Statistics Canada's publications on Federal spending. It was this document that introduced an analysis of provincial distribution of S&T federal funds.

Quebec's discourse on sovereignty

With the objective of cutting the fat from government research, MOST put forward in the early 70s a policy aimed at contracting out government research projects to the private sector. This contracting out policy added fuel to the

⁴³ Commission royale d'enquête sur l'organisation du gouvernement, Ottawa, 1963.

⁴⁴ *Une politique scientifique canadienne : Rapport du Comité sénatorial de la politique scientifique*, Information Canada : Ottawa, 3 volumes, 1971-73.

⁴⁵ OECD, *Politique nationales de la science : Canada*, Paris, 1969.

Quebec government's discourse on sovereignty. The Parti Québécois government (1976-1985) performed annual follow-up studies of the federal government's policy. It produced two series of publications (see Annex 2). The *Report on Federal Funds Granted to Quebec Business Firms (Relevé des subventions fédérales versées aux entreprises québécoises)* was published between 1980 and 1984, and *The Granting of S&T Contracts Within the Federal Contracting Out Policy (L'octroi des contrats ST dans le cadre de la politique d'impartition fédérale)* between 1981 and 1987. These were followed, in 1988, by the *Compendium* of scientific and technological indicators, whose 1994 edition was particularly critical of the federal government distribution of S&T funds.

In 1980, the Quebec government pushed its pursuits forward with a *White Paper on Scientific Development (Livre blanc sur le développement scientifique)*⁴⁶ which declared sovereignty one of the five principles of Quebec Science Policy. The government justified this principle by two arguments. First, by the necessity for Quebec to assume the responsibility of its economic development and to “assure, guide and finance its scientific development” (p. 91). Second, by the fact that “Quebec did not receive its fair share of federal funds in science and technology” (p. 93). It was Ontario that most profited from the federal government's financial generosity. The green paper *Toward a Quebec Policy for Scientific Research (1979) (Pour une politique québécoise de la recherche scientifique)* had indeed concluded that “the federal government has not really invested into scientific research in Quebec to the degree to which the Quebec population was entitled to expect” (p.48).

In 1988, the CSTQ introduced the notion of regaining past losses in a study on the federal government's contracting out policy.⁴⁷ The report stated that Quebec received only 75% of what ought to be expected in S&T by its economic and demographic weight. The blame was nonetheless shared: the report noted that Quebec businesses were not adequately connected with the network of federal civil servants and, more importantly, that they did not sign themselves onto the lists to which contract offers were sent.

The idea of regaining past losses was given heavy media coverage in Quebec, especially at the end of the 1980s. The media printed a potful of dietary metaphors: “Quebec Picks Up the Crumbs” (*Le Québec récolte des miettes*) (*Le*

⁴⁶ *Un projet collectif: Énoncé d'orientations et plan d'action pour la mise en oeuvre d'une politique québécoise de la recherche scientifique*, Gouvernement du Québec, 1980.

⁴⁷ Conseil de la science et de la technologie (1988), *La performance du Québec dans le cadre de la politique d'impartition*, Gouvernement du Québec.

Devoir, 30 June 1988; *La Presse*, 20 January 1989), “Quebec Stews a Strategy” (*Québec mijote une stratégie*) (*Le Devoir*, 10 April 1987), “More than Half of the Federal Pie Goes to Ontario” (*Plus de la moitié du gâteau fédéral à l’Ontario*) (*La Presse*, 24 March 1988). Other interesting metaphors included, “The Never Ending Rain” (*La série noire se poursuit*) (*Le Devoir*, 6 August 1988), “Ontario: Ottawa’s Favourite Child” (*L’Ontario reste l’enfant chéri du fédéral*) (*Le Devoir*, 3 August 1991), “Ontario Holds on to the Lion’s Share” (*L’Ontario conserve la part du lion*) (*Le Devoir*, 23 June 1986).

Statistics Canada did two things at this point. First, beginning in 1985, it presented external federal spending in terms of program types (contracts, grants).⁴⁸ The aim was to give a more nuanced picture of the situation. It described, for example, forms of government intervention that did not necessarily put Quebec at a disadvantage. It was shown that though Ontario received more federal contracts than Quebec, the reverse was true when it came to grants.

Second, Statistics Canada ceased publishing statistics on the NCR in 1991. Henceforth, the NCR was excluded from the provincial figures. This decision was preceded by a federal-provincial meeting on scientific indicators in 1988. During this meeting, provincial civil servants, and not only those from Quebec, pointed out the absurdity of placing the NCR alongside the provinces in the statistics.

The dropping of the NCR was preceded, a few years earlier, by a similar decision at Supply and Services Canada in its bulletin on federal R&D contracts. The bulletin had been published since 1973, in the wake of the contracting out policy. Beginning in May 1987, Supply and Services Canada stopped compiling statistics by province, leaving the tedious task to its readers.⁴⁹

In addition to Quebec’s discourse on sovereignty, it is worthwhile mentioning Western Canada’s sporadic autonomous discourses. Some provinces, particularly the Western provinces, criticised the federal government for favouring the two central provinces. British Columbia recently put forth a discourse strikingly similar to the one advanced in Quebec. The West coast province reproached Ottawa for not paying it its fair share of the federal pot.⁵⁰ Within Quebec and without, it is obvious to everyone that the bulk of federal spending is diminished when the NCR is set statistically aside.

⁴⁸ Statistics Canada, 88-204. These statistics were already produced during the 70s, but they were now reworked and rendered more visible.

⁴⁹ R-D *Bulletin*, Supply and Services Canada, 170, 1987.

⁵⁰ U. Koebberling and Veneranda Dettmers (1999), *Is BC Getting its Fair Share of Federal Spending on Science and Technology ?*, MAETT, Vancouver.

The 1995 Referendum

In 1995, Statistics Canada resumed its publication of statistics on the NCR. How is this to be explained? A political decision was probably made that cannot now be retraced because of the confidentiality of documents and correspondence. But in this particular case, it may very well be that to understand the political context is to understand what happened.

As mentioned above, the 1994 issue of the Compendium included a very critical analysis of federal spending in Quebec. It was followed by another series of studies produced by the Quebec government in 1995 in preparation for the referendum. First, there were the famous Le Hir studies, one of which dealt specifically with science and technology⁵¹ in which was presented a balanced picture of the future of Quebec science and technology in the context of a sovereign Quebec. Second, the Quebec government published, though without much fanfare, a far more critical study that called for the equitable distribution of federal funds.⁵² It claimed the reimbursement of \$2,5 billion in lost funding in science and technology between 1979 and 1991.

The Relationship between the Federal Government and Statistics Canada

Besides the three preceding events, there is a fourth factor explaining the presence of the NCR in the statistics: the relation of Statistics Canada to its patron.

Between 1960 and 1995, we may identify three types of relations between Statistics Canada and the government. First and foremost is the relation of “*interest*”. It was the National Research Council that enlisted Statistics Canada to take up the measure of science and technology. For instance, the first two studies on federal spending, in 1960 and 1962, were introduced and carried out in collaboration with the National Research Council.

A second influence is found at the level of the analyses themselves. It was MOST that initiated the data analysis for federal spending in geographical terms and that first introduced the NCR into federal statistics.⁵³ This study preceded Statistics Canada’s by one year. MOST also introduced the analysis on the

⁵¹ Godin, B., et J.-C. Thibodeau (1995), *La science et la technologie dans un contexte souverainiste*, Gouvernement du Québec : Secrétariat à la restructuration.

⁵² MICST (1995), *Les coûts du fédéralisme pour le Québec en matière de R-D*, Gouvernement du Québec.

⁵³ *Scientific Activities : Federal Government Costs 1958-59 à 1971-72*, 1971.

provincial distribution of federal spending,⁵⁴ which preceded Statistics Canada's by three years.

Finally, it was through its relationship to MOST that Statistics Canada was able to consolidate its science measurement program. The transfer of personnel from Statistics Canada to a Science Statistics Center within MOST resulted in replacing Statistics Canada's documents on federal expenditures with the red book. But once the staff returned to Statistics Canada in the aftermath of budget cuts to MOST in 1983, they created an autonomous Division in science and technology and an important new program of science measurement.⁵⁵

Table 4 – Location of Statistics Canada's Activities in the Measurement of Science and Technology

1960-71	Finance
1971-74	Education
1974-78	Education, Science and Culture
1978-83	(MOST – Science Statistics Center)
1983-88	Science, Technology and Stock Capital
1990ss	Science and technology Division

Conclusion

At Statistics Canada, the NCR exists only in relation to science and technology. Regional data are of course produced for economic and social statistics but in such cases the NCR never appears as an eleventh entity alongside of the provinces. Even for statistics on science and technology, the presence of the NCR is not generalised to all categories of measurement. For instance, the NCR appeared alongside of Montreal and Toronto between 1984 and 1989 with respect to industrial R&D, but only in terms of data concerning the CMA. Since then, however, these statistics have only appeared for the country's two largest cities. The presence of the NCR is not only selective but sometimes simply unwarranted. There are no statistics, for example, for the region's GERD/GDP: the NCR's GDP is unknown. Above all, no other country, to my knowledge, applies a similar treatment to a region on science and technology. Many

⁵⁴ *Federal Scientific Activities 1982-83*, 1981.

⁵⁵ See Statistics Canada, *News : Activities of the Science and Technology Statistics Program*, December 1987.

countries produce regional statistics, but never do they subtract a region from the national picture.

Two stakes motivated the presence of the region in science statistics. First, science policy and its need to produce information on the range of federal spending. This information was necessary for budget estimates and for the granting of federal contracts. This was probably the original motivation behind the appearance of the NCR in the statistics. Second, this motivation was reinforced by the issue of Quebec sovereignty. It was during the 1980s and 1990s that the largest amount of work was carried out on the construction of the NCR and it was during a referendum year that the NCR was definitively incorporated into the statistics.

But Statistics Canada has interests of its own as well. Part of its budget for the science program comes directly from Industry Canada. The science program was deeply affected by major cuts to its budget in 1992. Statistics Canada is doubtless highly attentive to the desires of its patron. Yet it also has an image of integrity to preserve. It has understood, since 1995, that the survival of its credibility depends upon the transparency of its data. Statistics Canada now produces “political” data that excludes the NCR from the provinces of Ontario and Quebec, but also other more transparent data with which it is possible to statistically “reconstruct” the provinces.

The identification of the NCR is statistically legitimate. First, the concentration of scientific and technological development in regional centres is a legitimate reason, after all, for producing regional data (it is, moreover, surprising that Statistics Canada did not do more with the CMA in the way of justifying the relevance of the NCR). Second, it must also be admitted that expenditures on federal laboratories in the NCR are not deliberately aimed at favouring Ontario’s regional development. The concentration of federal laboratories in the Ottawa region are contingent upon historical circumstance. A third reason for identifying the NCR - according to Statistics Canada - is the demand of its users, especially Quebec and other provincial governments. But if this is indeed the case, then why cease publishing data on the NCR between 1991 and 1994? How could provincial demand have possibly given rise to the exclusion of the NCR? Would not detailed and transparent figures have been the rule if provincial demand had truly been operative here? In short, has not the real patron always been the federal government?

The identification of the NCR is thus legitimate in several respects. What is in question (and questionable) is identifying a region in order to subtract it from the provinces. Indeed, Statistics Canada identifies and isolates the NCR for the

purpose of subtracting it from the provinces. Meanwhile, the *BSQ/MICST* continue to point out that 60% of intramural federal spending in R&D is devoted to Ontario, though they add, for good measure, that the advantage is due to the NCR.⁵⁶

It is often said that numbers help to settle controversial issues.⁵⁷ Just the opposite seems to be true in the case of federal statistics on science and technology.

⁵⁶ *Compendium : Indicateurs de l'activité scientifique et technologique*, Gouvernement du Québec, 1997 : p. 13.

⁵⁷ A. Desrosières, *The Politics of Large Numbers : A History of Statistical Reasoning*, Cambridge (Mass.) : Harvard University Press, 1998.

Annex 1

Statistics Canada Documents

Service Bulletins

1971-78	81-001 Service Bulletin
1977-83	13-003 Service Bulletin : Science Statistis
1983ss	88-001 Service Bulletin : Science Statistics

Federal Scientific Activities

1960	13-515 Federal Government Expenditures on Scientific Activities
1962-69	13-401 Federal Government Expenditures on Scientific Activities
1971-77	13-202 Federal Government Expenditures on Science
1972	13-545 Federal Government Expenditures on the Human Sciences
1971-78	13-205 Federal Government Activities on the Human Sciences
1984ss	88-204 Federal Scientific Activities
1985-88	88-206 Directory of Federal Government Scientific and Technological Establishments

Working Papers

ST-	Estimation des dépenses canadiennes en ST, nationale et selon les provinces
ST-	Provincial Distribution of Federal Expenditures and Personnel on Science and Technology

Other Documents

1974-76	13-403 R&D Expenditures in Canada
1978-82	13-212 Annual Review of Science Statistics
1983-89	88-201 Science and Technological Indicators
1984-86	88-203 Resources for R&D in Canada
1989-92	88-002 Indicators of Science and Technology

MOST Documents

Scientific Activities : Federal Government Costs 1958/9-1971/2, 1971.

Scientific Activities : Federal Government Costs and Expenditures 1963/4-1972/3, 1972.

Federal Scientific Resources 1972/4, 1973.

Federal Scientific Resources 1973/5, 1974.

Red Book

Federal Science Programs 1977/78, 1977.

Federal Scientific Activities 1978/79, 1978.

Federal Scientific Activities 1979/80, 1979.

Federal Scientific Activities 1980/81, 1980.

Federal Scientific Activities 1981/82, 1981.

Federal Scientific Activities 1982/83, 1982.

Documents Complementary to the Red Book

Federal Science Expenditures and Personnel 1976-77/1978-79, 1978.

Federal Science Expenditures and Personnel 1981-82, 1981.

Federal Science Expenditures and Personnel 1982-83, 1982.

Federal Science Expenditures and Personnel 1983-84, 1983.

Annexe 2

Quebec Government Documents

On Federal Grants

Bureau de la science et de la technologie, Relevé des subventions fédérales versées aux entreprises du Québec 1972-73 à 1978-79, 1980.

Bureau de la science et de la technologie, Relevé des subventions fédérales versées aux entreprises du Québec 1973-74 à 1979-80, 1981.

Bureau de la science et de la technologie, Relevé des subventions fédérales versées aux entreprises du Québec 1974-75 à 1980-81, 1983.

Ministère de la Science et de la Technologie, Relevé des subventions fédérales concernant la R-D industrielle 1975-76 à 1981-82, 1983.

On Federal Contracts

Bureau de la science et de la technologie, La politique d'impartition du gouvernement fédéral et l'octroi des contrats de R-D par le ministère des Approvisionnement et Services du Canada 1972-73 à 1979-80, 1981.

Bureau de la Science et de la Technologie, L'adjudication des contrats scientifiques et techniques par le Gouvernement fédéral dans le cadre de la politique d'impartition 1974-75 à 1981-82, 1982.

Ministère de la Science et de la Technologie, L'octroi des contrats scientifiques et techniques dans le cadre de la politique d'impartition fédérale 1974-75 à 1982-83, 1984.

Ministère de la Science et de la Technologie, Les contrats scientifiques et techniques octroyés au Québec dans le cadre de la politique d'impartition 1975-1976 à 1983-1984, 1984.

Ministère de l'Enseignement supérieur et de la Science, Les contrats scientifiques et techniques octroyés au Québec dans le cadre de la politique d'impartition fédérale 1977-78 à 1985-86, 1987.